AMERICAN
STATISTICAL ASSOCIATION.

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OUR COMING SEVENTY-FIFTH ANNIVERSARY.

By John Koren.

At a quarterly meeting of the Association held about fifty years ago, John Ward Dean, its faithful recording secretary for many years, "drew the attention of the members to the fact that soon a quarter of a century would be completed since the first meeting was held for the organization of this Association. He thought it desirable that the event should be noticed in some manner by the Association. An address, in which the progress of statistical science during the last twenty-five years and what this Association had done in that time should be shown, would be an appropriate mode of observing the occasion. This address should be printed, and if so it would no doubt do much towards furthering the objects of the Association." (From the minutes of the meeting.)

What cause for jubilation the founders of the American Statistical Association had as they looked back upon its service during twenty-five years is a story to be told in detail elsewhere. To the super-critical of our age, their record of things done may seem brief enough; yet theirs was the fine distinction of having kindled and kept alive a keen and discriminating interest in statistical work in the days of its infancy in the United States. At that time to have conceived of statistical inquiry as a science, always spelling it with a capital S, betokened courage and rare confidence in the future.

Let no one imagine that these early pioneers in our field were merely a group of parochial enthusiasts. Through corresponding members in fifteen states and in foreign countries they kept in touch with outside affairs and through special representatives took part in international statistical meetings. One of their early efforts was to assemble all available statistical publications by gift and purchase. Constant mention

is made in the records of "donations" to their library. But academic interest alone did not content them; they labored valiantly to instigate and vitalize statistical work in various directions, especially that to be undertaken by the federal government and by the states. They memorialized Congress in behalf of the census work, urged legislation for the improvement of vital statistics, etc. Also they encouraged each other to individual effort in statistical inquiry. Indeed, it was at one time almost a condition of fellowship that a certain amount of statistical work should be undertaken, or that papers on statistical subjects should be prepared.

Since Mr. Dean wrote the words quoted above, fifty years have been added to the history of our Association. One may fairly say that it has been a period of unbroken activity. There have been times of discouragement and depression when individual as well as collective efforts were at a comparatively low ebb; but always the faith has been kept alive in the things for which the Association stands. The organization has been kept intact. For twenty-five years the new series of our publications have appeared bearing witness to an amount of scientific interest and research of which no man need be ashamed. The Association is still the bond between those who follow statistical pursuits, speaking for their ideals and interests. And may we not modestly assert that in recent years the Association has become rejuvenated and may look forward to a larger usefulness? Its widening circle of supporters is growing more and more responsive. At no time has a demand for competent statistical work been as great as today. To the Association this means that a greater sphere of activity awaits it. The profession of statistics has by no means outgrown the formative period. It is therefore, perhaps, even more urgent than before that wise direction should be had and the ideals held high.

To commemorate the past achievements of a dead or dying organization may be a solemn duty, but it is not exhilarating. It is not so much the thought of what our Association has done, of its venerable age which places it in the forefront among similar organizations and high in the list of American Scientific bodies, that should give a real zest to our seventy-fifth anniver-

sary, but that we can safely reckon upon a future full of opportunities for increasing usefulness, confident in our vigor and enthusiastic over the duties before us.

Looking forward, then, it would be unsatisfactory to leave records of meetings as a sole memorial of our seventy-fifth anniversary. The occasion is worthy of larger effort than papers and addresses, no matter how able and timely they may be. We boast, with becoming modesty I hope, of world-wide interest in statistical endeavor. Therefore our anniversary should be productive of something permanently valuable not only to our own local parishes but to the world. It has been conceived that we can do this by publishing a memorial volume setting forth the progress and development in statistics for each of the civilized countries. The plan is, briefly, to secure the coöperation of men of the highest authority each of whom shall contribute an article for his country on this subject. The idea is not in the air but on the way to be realized. Well-known statisticians abroad to whom the plan has been broached have greeted it with enthusiasm and enough of them have given personal assurances of their willingness to participate to warrant success.

Among these men may be mentioned Sir J. Athelstane Baines (England); Dr. Würzburger (Germany); Professor Felix Faure (France); Professor Stuart (Holland); Professor Mandello (Hungary); Doctor Takarabe (Japan); Dr. Armand Julin (Belgium)—to take a few at random.

Steps have been taken for the proper representation of the following countries: Argentina, Australia, Austria, Belgium, Canada, Denmark, England, Finland, France, Germany, Holland, Hungary, Italy, Japan, Norway, Russia, Sweden, Switzerland and of course the United States. This means that articles will be written for each of these countries. It is hoped to add still others.

In order to secure some degree of uniformity of treatment, an outline has been prepared for the use of the prospective contributors. The suggestions offered, which are summarized in the following, have been put under three heads:

1. *Historical.* Brief sketch of the beginnings of official statistical work with reference to earlier statistical undertak-

ings by private individuals or organizations. Scope of earliest legislation. The most notable steps in subsequent development, etc.

2. *Present Statistical Organization.* Its basis in legislation. Scope of work in demography, economic, and social statistics. The personnel at the head of statistical offices; their opportunity for training, whether chiefly through practical work or through academic education. Enumeration of regular and occasional publications.

3. *Future Development of Statistical Organization.* Present general defects. The expansion necessary in view of the rapid economic and social changes with their manifold demands upon statistical research, as a basis for sound legislation and practical endeavor. The trend toward international coöperation in statistical work and its desirability. Possible needs of better training in statistics and larger inducements to take up statistics as a professional career.

It is of course not expected that the contributors will confine themselves to the narrow outline here summarized. So far as possible it has been indicated how much space ought to be given to each country, due consideration being given to the importance of its statistical work, in order that the proposed volume may not assume too large a bulk.

Judging from comments on our plan, it is meeting with general approval also in this country. There will be much work to do; I do not look at the task lightly. But when it is done we may hope to have a memorial volume of lasting value as an authoritative reference book that will not only afford much information now unavailable, but will help to stimulate interest in statistics and statistical organization in many places. The welcome accorded the plan and the readiness of busy men to promote it, encourages one to believe that it will fill a want. It is surely a happy and dignified way of celebrating our anniversary to give the statistical world something it needs and which it is creditable to provide.

Because of the large amount of work to be done even after the various articles are in hand, for they will among other things, be written in many tongues, no date of publication can as yet be set, but we hope it will be some time in the latter half of 1914.

The Anniversary Meetings.

Ordinarily, our gatherings are in the nature of a family affair. This time we should make them something more. The past of our Association and what it stands for have a meaning to those outside, and we should be remiss if we did not let them know about it. The implication is not that we wish to weary kindly disposed persons by recounting our own doings and achievements, but that we have an object which concerns them as well as ourselves. Moreover, we want active participation by universities, by other learned societies, and by individuals on an occasion like this. Therefore, representative guests will be invited and every effort used to make the anniversary the occasion of the most notable assembly of persons working or interested in statistics that has ever taken place in the United States. The success of it will depend largely upon the attendance of members, all of whom are urged to come even at possible inconvenience.

The dates fixed for the meetings are February 13 and 14, 1914, and the place Boston. There the Association had its birth, there it has always maintained headquarters, and it would be inappropriate at this time for us to offer hospitality elsewhere.

It is planned to have three sessions, a business meeting, and to close with a banquet.

No doubt one could easily devise sessions stretching out over several days, but the expediency of protracted meetings is not apparent. Technical papers and addresses belong to other occasions. At an anniversary like ours subjects of a more general nature are in place. The program has been fashioned with an eye to this. It is hoped that it will commend itself to all.

PROVISIONAL PROGRAM

OF THE

SEVENTY-FIFTH ANNIVERSARY MEETING

OF THE

AMERICAN STATISTICAL ASSOCIATION

BOSTON, MASS., FEBRUARY 13–14, 1914.

First Session, Friday, February 13, at 8 P. M.

1. President's Address
2. The Development and Progress in Statistics During Seventy-five Years, S. N. D. North
3. Brief Greetings by Invited Guests

Second Session, Saturday, February 14, at 10 A. M.

1. Co-operation between Academic and Official Statistics, Walter F. Willcox
2. The Service of Statistics:
   - *a.* To Economics, David Kinley
   - *b.* To Sociology, F. H. Giddings
   - *c.* To History, C. H. Hull
   - *d.* To Biology, Raymond Pearl

Third Session, Saturday, February 14, at 2.30 P. M.

1. Economic and Social Progress of the United States during Seventy-five Years, Frederick L. Hoffman
2. The Present Status of Statistical Work and How it Needs to be Developed in the Service:
   - *a.* Of the Federal Government, W. S. Rossiter
   - *b.* Of States, Adna F. Weber
   - *c.* Of the Municipalities, F. Spencer Baldwin
   - *d.* Of Private Societies and Organizations, W. S. Gifford

Saturday Evening—Banquet

THE CENSUS METHODS OF THE FUTURE.

By E. Dana Durand, *late Director of the Census.*

The decennial census of 1910 differed from its predecessors chiefly with respect to methods of analysis and publication of the material. The inquiries on the schedules were not materially different from those ten years or even twenty years before, and the methods of collecting the statistics in the field also remained substantially unchanged. While there is room for still further improvenent in methods of presentation, the most important questions for the future are of a different character. Of first importance is the problem of more closely adapting the census statistics, as regards scope and as regards frequency, to the needs of the public. Next to this comes the problem of increasing the accuracy of the field work. Another somewhat less important question is that of securing adequate local utilization, particularly by states and smaller political units, of the statistical material obtained by the federal government.

In considering the scope and frequency of census inquiries and the methods of securing greater accuracy, it will be most convenient to take up the great branches of the census severally, while the subject of the local utilization of the data may best be considered with respect to all the branches collectively.

Population Statistics.

The scope of the population census is reasonably satisfactory. It is difficult to name any inquiry which ought to be added. In fact the schedule is already somewhat overloaded and there are several inquiries that might well be spared. Accuracy suffers from the burden placed upon the enumerator and the person answering the inquiries. Even with the aid of elaborate machines, the Census Bureau can scarcely hope to to keep within the limits of money and time fixed by law in tabulating the results of so many inquiries.

For the past three censuses, the population schedules have carried questions regarding the number of children born to each woman and the duration of marriage, but never has the

Census Bureau had time or money to tabulate the answers. Probably it would be best at the next census to drop these questions from the general schedule and to seek information regarding the fecundity of the population by means of selected cases—a method which should give fairly satisfactory results with reference to a subject of this character.

The new inquiries regarding mother tongue, which were introduced into the schedule in 1910 under a special amendment to the census act, were found to involve very serious difficulties both from the standpoint of accuracy and from that of expense. The difficulties as to accuracy, however, were partly due to the late passage of the amendment, as a result of which there was no time to provide separate columns for these inquiries on the schedule. One cannot deny the scientific importance of the subject of mother tongue or nationality; these inquiries should doubtless be retained, though perhaps confined to the natives of certain specified countries, particularly Canada, Germany, Russia, Austria, Hungary, and Switzerland. At the present census, the tabulations were made in such a way as to show the characteristics—sex, age, marital condition, illiteracy and the like—of the foreign born and of the native whites of foreign parentage as classified both according to country of origin and according to mother tongue. It may be necessary for the sake of economy to give up the one method of classification or the other in connection with the tabulations of these characteristics, while using both as regards mere number of persons.

A very material addition to the tabulation expense of the census of 1910 resulted from the insertion of an inquiry in the schedule with regard to the industry in which the person enumerated was employed, in addition to the inquiry as to his trade or occupation. The Census Bureau has so tabulated the returns as to show with respect to each industry the number employed in each different occupation. For example, the statistics will show the number of stenographers or the number of salesmen in the steel industry, in the cotton industry, and so on. This cross classification of scores of industries with scores of occupations involved an enormous amount of detail in tabulation; about eight thousand classes were distinguished for each of the states and the larger cities.

The inquiry regarding the industry can scarcely be dropped, but, for the sake both of reducing expense and of expediting the publication of results, a less elaborate method of tabulation may be advantageous. The least expensive plan would be to use the industry returns merely for the purpose of defining more clearly certain occupations, so that the tables would have only one principle of classification although the number of occupations would be somewhat greater than otherwise. However, with comparatively moderate additional expense, it would be possible to show also the number employed in each industry—perhaps with some detail regarding their sex, race, nativity, and parentage—but without cross classification, that is, without distinguishing each occupation within each industry.

Of all the inquiries on the population schedule, the two regarding unemployment probably bring the least satisfactory returns. There is much difficulty in defining what constitutes unemployment. Often the workingman—or his wife or lodging-house keeper who may answer for him—cannot remember just how long he was unemployed during the preceding year. Pride or other sentiments may lead to answers known to be false. Moreover, unemployment statistics, to be of much use, need to be taken annually. It seems desirable to attack this statistical problem by some other means than the decennial census.

In 1910, as at previous censuses, there were two inquiries on the population schedule with regard to literacy—ability to read and ability to write. One would be enough. The statistics regarding ability to speak English are of no great value. Ability to speak a few words may lead to an affirmative answer to the inquiry in one case, while in another, only habitual use of the English language may be considered the proper criterion.

The frequency with which statistics should be collected depends upon the rapidity with which continuing or "long-time" changes in the phenomena occur and upon the presence or absence of considerable short-time fluctuations. In general the changes in the relationships of the population—in its composition and characteristics—are slow and continue for long periods in the same direction. The absolute number of inhab-

itants, however, may change rapidly. The extraordinary rate of growth in certain sections of the United States and in many cities throughout all sections, together with the considerable variations in that rate from period to period, renders intercensal estimation of population exceedingly difficult. An approximately accurate knowledge of the number of inhabitants in each locality year by year is most important, especially for the sake of death and birth rates. The need for frequent enumeration is to some extent met by local censuses, state or municipal, but there is seldom much public confidence in the accuracy of enumerations other than those taken by the Federal government.

Were it necessary to create a new field force for each enumeration, as has been the practice in the past, one would hesitate to recommend that the Federal government take a quinquennial census of population; but if simpler and cheaper methods can be devised, an enumeration intermediate between the regular decennial censuses might wisely be introduced. Only a few inquiries would be needed at such an intermediate census.

There is much need of greater accuracy in the population census. With regard to the more difficult inquiries on the schedule, the omissions and errors are quite too numerous. For example, in the case of about one tenth of the foreign born population of the country, no report regarding citizenship was secured at the 1910 census, and for the same proportion returns as to the year of immigration were lacking. If, in so many cases, no information at all can be got, it must be that many of the answers which are made are erroneous.

There is no way of estimating the average margin of error in the census returns of the number of inhabitants. For the country as a whole, and in most states, it is probably small. The fact, however, that in more than twenty cities the Census Bureau discovered extensive "padding" of the returns for 1910, in some cases amounting to as much as 30 or 40 per cent., cannot but raise suspicion as to the accuracy of the figures for some other places where the vigilance of the bureau officials may not have succeeded in detecting the fraud. It is certain that in 1900 several cities padded their returns heavily without being brought to book. On the other hand, there were in 1910 eight or ten places in which, by reason of complaints of incom-

plete enumeration, a new count was taken and in four or five of these, the recount showed materially larger numbers, the additions ranging from 4 per cent. to 20 per cent.—the extreme figure being, however, for a small town. Complaints of under-enumeration are likely to be made only by places where comparatively little growth of population is reported by the enumerators. It is possible that in some cases where the rate of growth is fairly high, and therefore satisfactory to the community, the enumeration is nevertheless somewhat incomplete.

It may be that greater accuracy with respect to the number of inhabitants could be secured by substituting the *de facto* for the *de jure* principle in census enumeration; that is, by counting persons where they are found on the census day instead of counting them where they belong. The attempt to decide who belongs in a given place involves most difficult questions of judgment. The enumerator may undercount by omitting persons who, though not perhaps permanent residents of his district, nevertheless should be counted there because they have no place of permanent residence. On the other hand, perhaps in entire honesty, perhaps with intent to swell the population fraudulently, he may make the opposite error. The *de facto* system would remove all difficulties of judgment, and would probably also reduce the opportunities for fraud. The change should not be made without further careful study.

The most important source of inaccuracy in the population statistics, however, is the incompetence and negligence of many of the enumerators. The greatest promise of improvement appears to lie in the employment of mail carriers to collect census statistics. There seems no doubt of the feasibility of this plan in the case of the country districts (see below). The matter is not quite so clear in the case of cities. The city carriers are by no means distributed in proportion to population. The business districts, where there are comparatively few persons to be enumerated, have many mail carriers, while the densely populated districts occupied by the poorer classes have relatively few. It would seem possible, however, to meet this difficulty by assigning special assistants to the carriers in the densely populated districts, these assistants being either persons temporarily employed for census work only or carriers from other parts of the city.

It is possible that in the cities the use of the mail carriers as enumerators would necessitate the omission of one or more of the daily mail deliveries during the period of census taking. The importance of a correct census would, however, justify this temporary inconvenience. Were it not for the extremely heterogeneous character of the population of our cities and the presence of a great many who are unable to speak English, the families might be expected to fill out the census schedules themselves. In that case the work of the carriers would consist of little more than delivering the blanks and collecting them later, and the mail deliveries would not be much disturbed. This system of self-enumeration is quite generally successful in Europe. In 1910 the Census Bureau, chiefly for experimental purposes, tried the use of "family schedules" in the large cities, in addition to the regular schedules filled out by the enumerators. It was found, however, that no very great proportion of the families, particularly among the less educated classes, filled out the schedules. This was due in part to the fact that there was no compulsion to do so, but even with a compulsory provision in the law the difficulties in some sections of the cities would be serious. It will probably be worth while, however, to continue the use of this device, especially in case the carriers are employed as enumerators.

Agricultural Statistics.

In order properly to consider methods of improving the agricultural statistics of the Federal government, one must take into account the annual work of the Department of Agriculture as well as the enumerations by the Census Bureau, heretofore decennial only.

Many agricultural phenomena, unlike most phenomena of population, are subject either to rapid continuing changes, or to decided short-time fluctuations, or to both. Hence the need of annual statistics regarding the numbers of domestic animals, particularly food animals, and regarding the acreage and production of at least the major crops. A census taken once in ten years, or even once in five years, may fail utterly to show the true trend in these respects, because the census

year may be by no means typical. Moreover, statistics of crops and of livestock are desired annually, and with great promptness, because of their effect on current prices, and on the conduct of business. The Census statistics of the past have been by no means adequate to the public needs from the standpoint of frequency.

This inadequacy, unfortunately, has not been satisfactorily remedied by the annual statistics of the Department of Agriculture. These, heretofore based solely on estimates, have been often so inaccurate as to be worse than worthless. This statement holds true, of course, only of the estimates regarding the numbers of domestic animals and the acreage and production of crops; the estimates regarding the condition of growing crops have perhaps been as good as could be expected in the case of matters necessarily of opinion.

It is understood that the new administration of the Department of Agriculture is considering the reorganization of its statistical work, and that in particular the use of the mail carriers to collect, not estimates, but actual returns at least of crop acreage is likely to be tested. It is needless, in view of the steps that are being taken, to criticize the errors of the past estimates or to make suggestions as to methods to be employed by the department in the future. It may be appropriate, however, to call attention to the bearing of this possible radical change in the methods of the Department of Agriculture upon the future of the agricultural census.

In the first place, the question naturally arises whether, if the Department of Agriculture decides to institute an annual enumeration—virtually a census—of certain important items, it would not be logical to turn over to that department also the more extensive decennial (or quinquennial) censuses of agriculture. Conversely, of course, the annual enumerations might be made by the Census Bureau. It would seem unfortunate not to utilize for both tasks the expert skill of the same body of statisticians and of tabulating clerks. In any case, duplication of work, with its possible conflict of data, should be carefully avoided.

In the second place, by whatever authority at Washington the enumerations are conducted, the rural mail carriers, if

used to collect the annual returns, should by all means be used to collect also all other agricultural statistics. The training obtained in the former task would be invaluable to them in the latter. Herein, in fact, lies one of the chief arguments in favor of the substitution of actual annual enumeration, through the mail carriers, for the present method of estimating the number of animals and the acreage and production of crops. Not only could the annual data thus be immensely improved, but likewise all other agricultural statistics. It was chiefly in the belief that the mail carriers would get more accurate returns than enumerators chosen by the old methods, that the writer, in his last annual report as director of the census, urged their employment for the agricultural census which, under recent legislation, is to be taken in 1915. It may be remarked, parenthetically, that if annual enumerations of the principal crops and of domestic animals are inaugurated by the Department of Agriculture, the need for the agricultural census of 1915, which by law is confined to the same topics, will apparently disappear. It is possible, however, that the public will ultimately demand more detailed information regarding agriculture as often as once in five years.

The large margin of error which has heretofore existed in some phases of the agricultural census is partly due to the inherent difficulty of the inquiries and to the fact that few farmers keep records or accounts of their business. It will never—at least for a long time to come—be possible to secure complete and accurate returns regarding such a subject as dairy or poultry products. At the Thirteenth census, for example, less than four fifths of the farmers who reported dairy cows on their farms in April, 1910, reported the quantity of milk produced during the preceding year, and many of those who did report gave highly inaccurate returns. The inherent difficulties are much less in such matters as the numbers of animals or the acreage and production of the principal crops, but even as to these they are considerable. In all directions, however, a great gain in accuracy should result from the employment of more competent and responsible enumerators.

The mail carriers, who are chosen by civil service examinations, are on the average more intelligent than the enumerators secured by the methods heretofore used. It is

naturally difficult to get competent men to take a temporary, and rather poorly paid job, like that of enumerator. Mail carriers have the advantage of personal acquaintance with practically every one in their districts. They would have a sense of responsibility owing to the fact that failure to perform their census work properly might result in loss of their permanent positions. They could, practically without loss of time, revisit the farms for which they had at first failed to secure information; enumerators heretofore have too often omitted such farms altogether, or made guesses for them. It goes without saying that if the rural mail carriers were to take the agricultural census, they should also take that of population in the country districts.

Aside from the gain in the accuracy of decennial census work which would result directly from the employment of mail carriers, accuracy might under this plan be further promoted in an indirect way. The system would permit a reduction in the number of inquiries covered by any one schedule. Instead of asking a multitude of questions in the one decennial year, part at least of the questions, aside from those asked annually, might be distributed through the intermediate years. A limited number of inquiries as to some particular topic such, for example, as the poultry business might be asked in one year, inquiries as to some other topic the next year, and so on, each topic being taken up again after an interval of ten years. Doubtless it would still be desirable to retain a larger number of inquiries, covering all the most important items of agricultural industry, for the year of the regular decennial census (1920, 1930, etc.), but more elaborate details could well be distributed.

Whether by this device alone, or by other means, or by a combination of methods, it is most desirable that the number of inquiries in the schedules used for the major, or decennial, censuses of agriculture should be greatly reduced. The schedule used in 1910, which was not much more elaborate than that of 1900, contained more than 500 inquiries. This multiplicity places an undue burden on even the most competent enumerator, as well as upon the farmer. It tends to increase the margin of error materially. Moreover, it necessitates the employment of a great temporary force of clerks in the

census office, in addition to the large number who must be employed for population work. It also prevents prompt publication of the results.

A second method of relieving the decennial schedule of agriculture without loss of valuable information would be by addressing certain questions only to selected farmers—selected of course, strictly at random. It is surprising that the method of securing typical data, so common in various other branches of statistical work, should never have been applied to census statistics of agriculture. It would be peculiarly adapted to information regarding values. If one tenth, or even one twentieth, of all farmers, scattered throughout the country, were asked to report the value of their live stock, or of the various products of their farms, average values computed from these returns and applied to the numbers or quantities reported from all farms would give substantially correct total values. The omission of questions of value would alone reduce the bulk of the general agricultural schedule nearly one third. A combination of this plan with that of transferring part of the inquiries to other years would make possible a very great reduction in the burden on the enumerators, the farmers and the census office. In fact, it would permit the addition of some valuable inquiries which have heretofore been necessarily left untouched.

If neither of these last two somewhat radical changes in the methods of the agricultural census be adopted, then, no matter how competent may be the enumerators, the census schedule of agriculture should, in the interest of accuracy, be materially reduced by omitting altogether the less important inquiries. Space will not permit a discussion of the relative importance of the various questions. Few of them could be spared without considerable loss. The schedule of 1910, besides embodying the experience of past censuses as to the information desired by the public, was framed after long consultation of experts from the Department of Agriculture and from agricultural colleges.

The plan of employing mail carriers to make an annual canvass of the farms with reference to domestic animals and major crops will be somewhat more expensive than the present system of estimates used by the Department of Agriculture. The mail carriers will have to be paid, and the cost of tabulating

the returns in Washington will be considerable. However, the cost will not, in all probability, reach half a million annually. The mail carriers would soon find it possible to have most of the schedules filled out by the farmers themselves, and the pay of the carriers would not need to be large. The increased reliability of the results would more than justify the cost even if the carriers performed only this annual work. When to this gain is added the greatly increased accuracy of the decennial census data which would follow from using the mail carriers, thus trained, to collect them also, there should be no hesitation in deciding in favor of the new plan. Moreover, it is probable that a fair compensation to the rural mail carriers for taking the decennial census would be less than the pay necessary to secure temporary enumerators; so that the aggregate cost, during a decade, of collecting statistics of agriculture and population in the rural districts might be little if any greater than at present.

To recapitulate, it seems desirable in the future: (1) to employ the rural mail carriers to collect all Federal agricultural statistics, and also to collect population statistics in the country districts; (2) to obtain annually, by actual enumeration, the numbers of domestic animals and the acreage and production of the principal crops; (3) to distribute part at least of those inquiries which need to be asked only at decennial (or quinquennial) intervals among the individual years of the decade (or of the five-year period); and (4) to rely upon data from selected farms for most information regarding values.

Statistics of Manufactures.

The greatest defect in the statistics of manufactures collected by the Federal government is the absence of annual data. The census of manufactures, taken once in five years, is the only governmental source of information. A second defect lies in the fact that the quinquennial census fails to disclose, even with respect to those phenomena which are not rapidly variable, much information which is eagerly desired by the public. The methods of collecting the census of manufactures, which are entirely different from those used for population and agriculture, are reasonably satisfactory. The margin of error as to the more important inquiries is not very great, for, al-

though many of the smaller concerns give only approximate figures, most of the larger concerns, whose returns dominate in the totals, give accurate bookkeeping data.

The quantity and value of the annual output of many classes of manufactured articles is subject not only to rapid changes of a continuing character, particularly those due to the development of new industries, but also to decided short-time fluctuations. Statistics of quantities and values collected only once in five years may give a very misleading idea regarding the tendencies. Moreover, current statistics, promptly published, concerning the more important commodities are needed as a guide to business policies, not only of the persons manufacturing, dealing in, or consuming those particular commodities, but also, in some cases at least, of the entire industrial and commercial world.

Business men frequently complain of the delay in the publication of census statistics of manufactures. This delay is an almost inevitable result of the fact that the quinquennial censuses cover scores of thousands of insignificant establishments and include a large number of inquiries. In any case, however, prompt publication of the data obtained by quinquennial censuses would bring no very great gain, since month by month and year by year after publication the statistics regarding the more variable phenomena become increasingly obsolete. Nothing short of annual returns will meet the needs of the situation.

The importance of securing annual statistics is so great that it would, if necessary in the interest of economy, justify the substitution of decennial for quinquennial enumeration of those phenomena of manufacturing industry which either are of minor importance or which change with comparative slowness and uniformity. It would probably cost little more to collect a limited amount of important information during every year of the decade than it costs to take a single census of the present elaborate type.

In general, only three topics would need to be covered by an annual census of manufactures; namely, the quantity of products, the value of products, and the number of wage earners. For a few industries statistics of the quantity and cost of materials might be desirable. Moreover, information

would be needed only with respect to the major industries and their more important products and materials. It would, of course, be interesting to those engaged in every individual industry to have annual data regarding it, but there would be no great gain to the general public from making the annual returns thus comprehensive. Finally, the trend of the major industries could perhaps be ascertained with sufficient correctness by canvassing only the larger establishments, say those which, together, have nine tenths of the business.

It should be possible, by careful selection of industries, products and establishments, to reduce the cost of collecting and tabulating annual statistics to a very reasonable figure, and also to permit that promptness of publication which alone would justify an annual canvass.

Promptness and economy could both be furthered by the plan of securing reports by mail; a plan already pursued with fair success by the Census Bureau in collecting annual data regarding forest products and by the Geological Survey in collecting annual returns from mines. A limited field force would doubtless be necessary to follow up delinquent establishments.

The demand for such annual statistics of manufactures is insistent. The Census Bureau and other government departments are constantly besieged for it by manufacturers, by publicists, and by the general public. Even though the cost might reach several hundred thousand dollars a year it would be money well spent. The system of annual returns should be inaugurated at the earliest possible date.

Whether or not the plan above suggested be instituted, somewhat radical changes should be made in the scope of the general censuses of manufactures and in the methods of presenting the results. There are, in this respect, two chief defects at present. The first is the lack of information as to the quantity and value of a great many important specific products. The other is the lack of definiteness and unity in many of the industry classifications.

The number of specific commodities manufactured in the country is enormous, and many individual commodities are of numerous grades and sizes, which need to be distinguished, particularly if any information of value is to be secured regarding average prices. The census schedules already call for

the quantities and values of more than a thousand commodities, including most of those which are well standardized. As to the industries for which "special schedules," containing inquiries regarding specific materials and products, are used, the amount of detail now being secured is fairly adequate; indeed, in a few industries the details are perhaps unnecessarily numerous. There are, however, a good many industries, including several of great importance, for which no special schedules are used and no information regarding the quantity and value of specific products obtained. Notwithstanding the difficulties due to the multiplicity of products and to lack of standardization, a considerable extension of the inquiries in this direction should be attempted.

For example, the census furnishes us no information regarding the number of value of any class of machines, except agricultural implements, produced in this country. It tells us nothing with regard to the number of garments, other than underwear, made by the great clothing industries. There is no information concerning the number of articles of furniture of different kinds turned out. At least once in ten years, it would seem, the country should take a detailed account of its output of as many separate commodities as are of any material importance and as can practicably be distinguished.

The lack of clean-cut grouping of establishments into distinctive and unified industries is the natural result of the fact that many establishments overlap two or more branches of manufacture. With respect to statistics other than those of the quantity and value of specific products, each establishment canvassed by the census must ordinarily be classified, as an entirety, in some one industry or group. If an "overlapping" establishment—one which manufactures two or more different lines of goods—is classified as a whole according to its major product, the importance of the industry tc which it is assigned is exaggerated, and that of some other industry or industries understated. In order to avoid this difficulty, the Census Bureau has heretofore tended more and more to combine related branches into larger classifications, into what are really industry groups rather than specific industries.

For example, nine classifications which were distinguished at the censuses of 1900 and 1905 were combined in 1910 under

the one heading "Foundry and Machine Shop Products." This enormously comprehensive "industry" is so utterly lacking in unity that the statistics concerning it are of no real value to the public. Data for establishments making steam engines exclusively are totaled with those for establishments making printing presses exclusively, for establishments making elevators exclusively, for establishments making bells exclusively, and so on. There is no available information regarding the specific industry of making engines, or elevators or bells. Literally hundreds of the recognized industries of the country are entirely buried by this process of consolidation of related industries.

The demand for information regarding specific industries is a strenuous one. During the consideration of the recent tariff legislation, the Census Bureau was constantly being asked for information regarding such matters as the relation of wage payments and cost of materials to value of products for some specific industry as to which, under its method of classification, there were no separate data. It will never be possible to supply statistics—other, of course, than those regarding quantity and value of output—for the entire business of producing each separate class of commodities. The items for the overlapping establishments cannot be apportioned satisfactorily among the different branches of their business. It would, however, be possible to furnish information of great value by tabulating separately the statistics for those establishments which confine themselves, strictly or substantially, to each single class of products—in other words, for the typical establishments in each specific industry. While in some cases the "one line" establishments together may do less business in that particular line than the more comprehensive overlapping establishments, this is not usually true.

The plan suggested is merely that in the future the more heterogeneous industry groups now made by the Census Bureau, while retained as to their totals, should also be subdivided into more or less numerous specific industries with a residual group for the overlapping establishments. Naturally the quantity and value of each specific class of commodities distinguished in the special schedules would be tabulated for all establishments regardless of the particular industry to which

assigned. This, in fact, is done at the present time by the Census Bureau.

If the various changes in methods above suggested should be found to involve undue expense, a counterbalancing saving could be made in another direction. The number of inquiries regarding the finances of manufacturing concerns—inquiries on the general schedule as distinguished from the special schedules—could be reduced. The Census Bureau has gone unnecessarily far into details in the past. It has called for several separate classes of expenditures and yet, after doing so, it has been forced to warn the public that to deduct the total for all the reported items of expense from the reported value of products would furnish no satisfactory information regarding the amount of profits, and that, if it did, the rate of profit on investment could not properly be computed because of the inevitable errors of the returns regarding capital invested. Except the items as to expenditures for wages, for materials and for fuel and power, the financial statistics are of little utility. Several inquiries which were included in the general manufactures schedule of 1900 and 1905 were omitted in 1910, not so much to reduce the amount of work as because it was considered practically impossible to obtain correct answers by the available census methods; but still further pruning may be worth while.

To recapitulate, it seems desirable for the future: (1) to provide for the collection annually and the prompt publication of statistics regarding the number of persons employed in the leading manufacturing industries and the quantity and value of their principal products, most of the data being secured by correspondence methods; (2) to take the more detailed censuses of manufactures (at least for the immediate future) only once in ten years; (3) to obtain at the decennial census statistics regarding the quantity and value of as many specific products as practicable; (4) to distinguish in the tabulations as many specific industries as possible; (5) to omit from the general schedules the items regarding capital and the items regarding expenses other than those for wages, for materials, and for fuel and power.

Statistics of Mining.

The situation with respect to the Federal statistics of mining is entirely different from that with respect to the statistics of manufactures. The need for annual data has already long been supplied by the Geological Survey, which publishes the quantity and value of the minor as well as the major products, together with considerable information regarding the number of wage earners, the hours of labor, and the use of machinery. The problem of the classification of establishments presents no such difficulties as appear with respect to manufacturing establishments.

The object of the decennial census of mines, taken by the Census Bureau, is to obtain certain details regarding the conditions and methods of the various mining industries which are not obtained annually by the Geological Survey. A coöperative arrangement has been made by which duplication of work is almost wholly avoided. Some minor changes in the census schedules of mining and in the methods of compiling and analyzing the statistics may be desirable, but there is no apparent occasion for radical changes of policy.

Local Utilization of Federal Statistics.

As an incident to its work of obtaining statistical totals for the country as a whole or for large geographical units like states, the Census Bureau of course is in a position to compile corresponding statistics for every smaller locality in the country.

The Census Bureau has always been very liberal in its expenditure of funds for the local presentation of details. A large mass of information regarding population is presented for each county and even for each incorporated place of 2500 or more inhabitants. Hundreds of items are published regarding the agriculture of each county. Yet there is from many quarters a demand either for more details regarding areas for which some data are already published, or for statistics regarding still smaller areas than are now distinguished in the reports. For example, there was, at the late Census, an urgent request from several of the larger cities for somewhat detailed population statistics regarding areas smaller than the wards, which are the smallest areas heretofore distinguished. In some cases,

the demand was even for statistics regarding individual city blocks. Again, from several states there came requests for statistics of agriculture by townships, the smallest local unit distinguished by the Census Bureau being the county.

The expense of tabulation is greatly increased when the totals for states or other large areas, instead of being obtained directly by adding the original returns, are obtained indirectly by assembling subtotals for smaller areas. For example, if there were no distinction of counties or cities in the population census, the cost of tabulating would be reduced greatly, perhaps as much as half. Cost of printing is similarly greatly increased by giving extensive local details. The Census Bureau is therefore between two fires. On the one hand, it is often criticised for the large expenditures in tabulating and printing local details; on the other hand, it is criticised for not furnishing still more such details.

It is clearly the duty of the Federal government in the general public interest to compile such local statistics as may be necessary for a correct understanding of the more general phenomena. The thorough student of some economic or social problem affecting the country as a whole is likely to need data for individual states, and may need them for sections of states, for individual cities, or for classes of cities. Nevertheless, there is a limit to the amount of local detail which possesses any material interest for persons outside the locality itself. On the other hand, the citizens of a given community may have real interest in, and need for, most elaborate statistical data regarding it.

It would seem logical that those details which are of little or no interest except to the people of a given locality should be tabulated, if at all, at the expense of the people of that locality. It would scarcely be possible or desirable in the future to throw upon local communities any part of the cost of tabulating and publishing such details as have hitherto been published at the expense of the Federal government itself. The tradition in favor of the present practice would be too strong to overcome. The Federal government, however, can scarcely be justified in itself incurring the expenditure necessary to present many more local details than have heretofore been presented. It is the more appropriate that the additional expense involved should be borne by the localities

concerned, because the information desired by one locality often differs from that desired by another. There seems here a large field for coöperation between the Census Bureau and the states, or directly between that Bureau and individual cities or other political subdivisions of states. Certainly it seems a needless waste to compel states or local communities to duplicate the original work of collecting data which are already collected by the national government.

There are two general ways in which such coöperation might be effected. In the first place, the Census Bureau might furnish states or localities with duplicates of the original returns, the whole process of tabulation being performed locally. By the use of photographic and other modern methods the cost of duplication might be reduced to a minimum. In the case of statistics which are tabulated by means of punched cards, duplicates of such cards might be furnished, provided, of course, the local authorities had the necessary machinery for handling the cards. It would not be difficult to devise a punching machine which would punch two similar cards at one time with little added expense.

A second method of coöperation would be for the Census Bureau to perform the entire work of tabulating the added local details desired, charging the expense to the local authorities.

At the present time it is virtually impossible to adopt either of these two methods. To be sure, the law authorizes the Census Bureau to furnish copies of schedules to local communities or others at their expense, and this has been interpreted by the Bureau as authorizing it also to make tabulations for them at their expense. This provision is, however, practically unworkable, because the appropriation acts year by year expressly specify the number of clerks of each particular grade who can be employed. Consequently, even though the funds are available from outside sources, no additional clerks can be employed within the Bureau. During the three year "census period," when the number of clerks is not expressly limited, such outside work could perhaps be performed. It is probable, however, that, if it were done on a large scale, criticism from Congress would result, unless more specific legal authority were first secured. Consequently a prerequisite for satisfactory coöperation between the Census Bureau and local communities is further Federal legislation.

In most cases it would be more satisfactory to local communities which desired special statistical details to pay the Census Bureau for compiling those details than to tabulate them locally from duplicates of the original returns. The local authorities usually lack a skilled force of statistical clerks and experts, as well as the machines and appliances necessary for the most economical work. Perhaps in the course of time our states and our leading cities may develop efficient organizations for statistical work, but in the meantime the Census Bureau can tabulate statistics much more cheaply than the great majority of states or cities.

From the standpoint of the Census Bureau, on the other hand, there are difficulties in the way of performing tabulation work for outsiders. In the first place such special work is likely to cause delay in the more general tabulations. If totals to be published by the Census Bureau are compiled by summarizing subtotals compiled for others, more time is required than for direct tabulation; this is true no matter if additional clerks are employed and paid for by the local governments. In the second place it is practically impossible to distinguish the cost of local work from that of general work so long as the two are merged in one process. To do so necessitates an estimate, rough at best, of the cost which would have been incurred had a different method of tabulation been employed, and the subtraction of this estimate from the actual cost to determine the added expense.

There would be only one effective means of obviating these two difficulties. This would be by a practically complete separation of the work performed at local expense from that performed at Federal expense. This could be done, for example, in the case of population statistics by making duplicate cards for the inhabitants of any community which desired special details—the additional cost of duplicating the cards would be easily calculated—and turning these over to a separate force of machines and of clerks for tabulation. This plan would involve some sacrifice of economy. It would place a somewhat greater expense upon the locality than would be represented by its share of the joint cost of securing both kinds of results through one process. It would, however, in most cases, be materially less expensive than for the localities to attempt to tabulate the statistics themselves.

COMPARATIVE FECUNDITY OF WOMEN OF NATIVE AND FOREIGN PARENTAGE IN THE UNITED STATES.

By Joseph A. Hill, *United States Bureau of the Census.*

In the last part of the 28th volume of the forty-two volume report of the recent Immigration Commission is a statistical monograph of less than one hundred pages on the Fecundity of Immigrant Women.* In preparing a summary of this monograph for the Quarterly Publications of the American Statistical Association the writer has acted on the belief that the subject is of sufficient interest and the data of sufficient value to justify their presentation to a larger public than is likely to come upon them in the voluminous and to most people, more or less inaccessible reports of the Commission.

The monograph is more comprehensive in scope than the title suggests, for it presents data not only for foreign-born or immigrant women but for native women as well. Moreover, it distinguishes native women whose parents were foreign born from those whose parents were native. The comparisons between these three classes, indeed, constitute the most interesting feature of the report.

For the basic data used in the preparation of this report the Immigration Commission was indebted to the United States Census. Few persons perhaps are aware that at each of the three last censuses—those of 1890, 1900, and 1910—the census enumerators ascertained and recorded on the population schedules the number of children that had been borne by every woman enumerated in the United States. Of the valuable data thus obtained all that has ever been published as yet is contained in this report of the Immigration Commission. The failure of the Census Bureau to make any use of the returns

* The Immigration Commission was created by an act of Congress passed February 20, 1907. It comprised three senators, three members of the House of Representatives, and three other persons appointed by the President, and was organized for the purpose of making a "full inquiry, examination, and investigation . . . into the subject of immigration." The Commission completed its labors and published the report embracing its conclusions in December, 1910.

The monograph on the "Fecundity of Immigrant Women" was prepared for the Commission under the direction of Joseph A. Hill, one of the chief statisticians in the Bureau of the Census, assisted by Julius H. Parmelee.

of 1890 and 1900 is explained on the ground that the magnitude of the task of tabulating the data led to the postponement of the undertaking pending the completion of other lines of census work which were considered to have precedence both on account of their primary importance and because they had regularly formed a part of prior census reports. It is to be hoped and, in fact, is probable that the returns obtained at the census of 1910 will not be similarly neglected, but as yet no steps have been taken towards their tabulation.

The Immigration Commission, when its attention was called to the existence of this material, recognized its significance and obtained permission to make a tabulation of the data contained in the schedules of the census of 1900, the census of 1910 not having been taken at that time. With the small force of clerks that could be detailed to this branch of the Commission's work it was impossible, however, to do more than compile and present the facts for a few more or less typical communities in the vast population of the United States. It was not practical to cover even a single great metropolis like New York or Chicago. The areas finally selected for this investigation included the state of Rhode Island, the city of Cleveland and 48 mainly rural counties in the state of Ohio, and the city of Minneapolis and 21 mainly rural counties in the state of Minnesota. The state of Rhode Island was selected as representing conditions in the East where manufacturing is the principal industry and the population is mainly urban with a large foreign element. About four fifths of the population of that state live in cities of over 10,000 inhabitants and about one third are of foreign birth. Cleveland and Minneapolis were selected as typical of conditions in cities of the Middle West, while the selected counties in Ohio and Minnesota were taken as representing conditions in farming communities in that section of the United States. The selection, moreover, was made with a view to securing an adequate representation of the principal foreign races or nationalities in the immigrant population of the United States. Rhode Island furnished a fairly adequate representation of the Italian and French Canadian immigrants; Cleveland of the immigration from Austria, Hungary, and Russia; and

Minneapolis of that from Scandinavian countries. The rural counties of Ohio gave a fair representation of the Finns. Most of the other principal classes of immigrants were represented in considerable numbers in more than one of these communities.

It is evident that in any study of fecundity the data in regard to the number of children borne should be correlated with the age of the mother and the number of years she has been married. In fact this information is almost essential. The knowledge that one married woman has borne three children and another four justifies no inference regarding the relative fecundity of these two women until we know how long each has been married and her age. Age is recorded by the census for every person enumerated and the duration of the marriage is also recorded for all persons living in the married state at the time the census was taken. In case of a widow, however, the latter information is lacking, the duration of her marriage not being stated in the census. In view of this fact it was thought best to confine the tabulation to the data recorded for married women. The aim of the Commission was to secure the most significant results with the minimum amount of labor, and it was believed the best results could be obtained by further confining the tabulation to women under 45 years of age, since their married life would for the most part be within the child-bearing period. In fact most of the tables presented in the report are restricted to women under 45 years of age who had been married not less than ten nor more than twenty years. The report states that "the lower limit of 10 years was adopted with a view to limiting the comparison to women who had been married long enough to have borne at least three or four children, and also with a view to excluding women who married after the age of 35, and for whom therefore a prior marriage was rather probable. The upper limit of 20 years was selected somewhat arbitrarily, but with the idea of not having the limits any further apart than was necessary to include enough women to make the figures significant. In more general terms the women considered may be defined as married women of child-bearing age who are in the second decade of their married life."

The possibility of a prior marriage here referred to was a disturbing factor in the comparison of the number of children with the number of years married, for the reason that the number of children reported by the census included all children borne by the woman up to the time the census was taken, while the number of years married related only to the existing marriage. All cases in which the number of children was too large to have been borne during the existing marriage were eliminated. But it is admitted that there must have been a considerable number of cases of prior marriages which were not revealed by any disproportion between the number of the children and the duration of the present marriage or by any other evidence, and that the inclusion of these cases introduces a small element of error, the effect of which is to exaggerate slightly the fecundity of present marriages by crediting them with the children born of prior marriages. The writer introduces statistics to show that the effect of the error is practically inappreciable, especially in view of the probability that it affects all the different classes to about the same degree. It appears that in the state of Massachusetts, of the women who marry under the age of 25 only 1.1 per cent. have been married before, for those marrying under the age of 30, the percentage of prior marriages is 2.9, and for those marrying under the age of 35 it is 4.6.

The total number of women for whom data were tabulated was 185,788; of these, 78,432 had been married from 10 to 20 years, this being the class for which as previously stated the data are presented in greatest detail.

The women were classified according to the country in which both parents were born—as being of "native parentage" if both parents were born in the United States, of "foreign parentage" if both parents were born in foreign countries, of "Italian parentage" or "nationality" if both parents were born in Italy. Each foreign parentage class was furthermore subdivided into two classes so as to separate the immigrant women, who were themselves born abroad, from the women born in the United States of immigrant parents, the former class being designated as the "first generation," the latter as the "second generation." Women whose parents

were born in different countries, for instance, father in Italy and mother in Austria, or father in Germany and mother in the United States, were omitted from the tabulation because it was found that the number of cases under each of the many combinations of mixed parentage would be too small to serve as a basis for any conclusions as to the effect upon fecundity of a mixing of races.

Of course it must be recognized that a classification based on country of origin is not equivalent to a classification by race for the reason that many foreign countries include a diversity of races. Austria, for instance, includes a number of diverse races. But these could not be distinguished on the basis of the returns of the census of 1900. We know that comparatively few of the natives of Russia who migrate to the United States are Russians in the ethnical sense of the word. The great majority of them are racially classed as Hebrews, Poles, and Lithuanians. In other cases, however, the country of birth practically defines the race. This is true of such countries as Ireland, Scotland, France, Denmark, Norway, and Sweden, the inhabitants of each of these countries being mainly homogeneous as regards race. From the classification by country of birth the census of 1900, however, made two rather important deviations: It separated the Poles—defined as persons who speak Polish and were born in what was formerly Poland—from the other natives of Austria, Germany, and Russia; and it distinguished between the Canadian French and the Canadian English in case of persons born in Canada.

In the tables published in this report the fecundity of the several nationalities or parentage classes of married women is indicated by four different *criteria*, as follows:

(1) Number and percentage of women bearing no children.
(2) Average number of children per woman.
(3) Number and percentage of women bearing not more than two children; from three to five children, inclusive; and more than five children.
(4) Average number of years married per child borne.

The facts as to the relative number of married women who have had no children are shown for the main classes covered by this investigation in the following tabular statement:

Class.	Women under 45 Years of Age Married 10 to 20 Years.		
	Total Number Tabulated.	Bearing no Children.	
		Number.	Per Cent. Total.
All classes	78,432	5,775	7.4
White—native parentage	15,953	2,097	13.1
White—foreign parentage	61,816	3,541	5.7
First generation (born abroad)	37,788	2,018	5.3
Second generation (born in United States)	24,028	1,523	6.3
Negro	663	136	20.5

The contrasts brought out by the above table are very striking. Of the women of native parentage included in this tabulation, 13.1 per cent. had had no children; of the women of foreign parentage, only 5.7 per cent. In other words, approximately one woman in eight among women of native stock was childless as compared with about one in twenty among women of foreign stock. There is, moreover, an appreciable difference between the first generation of the foreign stock, or the women who were immigrants, and the second generation, or the woman whose parents were immigrants. Of the former 5.3 per cent. had had no children; of the latter, 6.3 per cent. Thus the immediate effect of an American environment would appear to be a diminution in fecundity, and this inference is confirmed by the other data to be presented later.

Very remarkable and perhaps rather unexpected were the results brought out for Negro women. The Commission did not deliberately undertake to secure statistics for this class. The Negro women covered by the tabulation were, so to speak, picked up incidentally, comprising those who happened to be in communities which had been selected with a view to ascertaining the facts in regard to immigrants in comparison with the native white stock. But the results for the Negro women are none the less significant, showing as they do a degree of barrenness far exceeding that for the white women of American stock. Of the married Negro women 20.5 per cent., or one in five, was childless. The number tabulated

was not large, but the results are believed to be typical, especially as the percentage was about the same in the different sections of the country included in the investigation, omitting the rural portions of Ohio and Minnesota, where the numbers were too small to justify showing any percentage.

Area Covered.	Negro Women under 45 Years of Age Married 10 to 20 Years.		
	Total Number Tabulated.	Bearing no Children.	
		Number.	Per Cent. of Total.
Total area tabulated	663	136	20.5
Rhode Island	360	81	22.5
Cities of over 10,000 inhabitants	299	69	23.1
Remainder of the state	61	12	19.7
Cleveland	235	46	19.6
Minneapolis	47	9	19.6
Rural counties of Ohio	19	..	*
Rural counties of Minnesota	2	1	*

* Percentage not shown, because of small numbers involved.

Of course the results here obtained are indicative only of conditions among Negro women in the North and mostly in northern cities. In the South conditions may be and probably are very different. The statistics presented suggest, moreover, that they may be very different in the rural West, although the numbers given are believed to be too small to justify giving a percentage.

Anticipating a little the data to be presented later, it may be mentioned in this connection that while relatively more Negro women than white women of native parentage have no children, the average number of children borne by Negro women exceeds the average for white women of native stock. This indicates, of course, that those Negro women who have children have a larger number on the average than the white women who have children. The average number of children per woman in the class of married women under 45 years of age married 10 to 20 years was 3.1 for Negro women, as compared with 2.7 for white women of native parentage. Excluding the women who were childless, the

average becomes 3.9 for the Negro women, as compared with 3.1 for the white. Generalizing, it might be said that the Negro woman in the North either has no children at all or else has a good many children.

As previously explained, the women of foreign parentage were classified according to country of birth of parents, and the results, as might be anticipated, reveal a wide range of variation in different nationalities or races. In the following table the several foreign classes or nationalities are arranged in order of decreasing percentage having no children.

Class.	Women under 45 Years of Age Married 10 to 20 Years.		
	Total Number Tabulated.	Bearing no Children.	
		Number.	Per Cent.
All classes	78,432	5,775	7.4
White—native parentage	15,953	2,097	13.1
White—foreign parentage	61,816	3,541	5.7
Scotch	1,209	115	9.5
English	5,352	480	9.0
French	329	29	8.8
Canadian English	1,349	118	8.7
Irish	9,975	779	7.8
Hungarian	1,011	73	7.2
Swiss	858	50	5.8
Welsh	764	40	5.2
Austrian	774	40	5.2
Canadian French	2,875	143	5.0
Italian	1,167	57	4.9
Finnish	312	15	4.8
Swedish	3,373	159	4.7
German	23,003	1,082	4.7
Norwegian	3,185	140	4.4
Danish	618	24	4.0
Russian	656	17	2.6
Polish	1,476	37	2.5
Bohemian	2,398	60	2.5
Other foreign parentage	1,132	82	7.2
Negro	663	136	20.5

Of the various foreign nationalities, the Scotch have the largest percentage of women who have had no children, the English ranking next in this respect, then the French and after them the Canadian English, or more strictly speaking the Canadians exclusive of the Canadian French. But it will be noticed that in no foreign nationality is the percentage of childless women as large as it is among the native white

women of native stock. The Poles, the Bohemians, and the Russians (consisting largely of Russian Jews) have the smallest percentages of childless women.

The next table gives the average number of children born per married woman, the data as before relating to women under 45 years of age married 10 to 20 years.

Class.	Women under 45 Years of Age Married 10 to 20 Years.		
	Total Number Tabulated.	Total Number of Children.	Average per Married Woman.
All classes	78,432	317,747	4.1
White—native parentage	15,953	42,933	2.7
White—foreign parentage	61,816	272,763	4.4
English	5,352	18,415	3.4
Canadian English	1,349	4,668	3.5
Scotch	1,209	4,321	3.6
Welsh	764	2,879	3.8
Swedish	3,373	14,199	4.2
French	329	1,413	4.3
German	23,003	99,412	4.3
Irish	9,975	44,308	4.4
Swiss	858	3,764	4.4
Hungarian	1,011	4,582	4.5
Austrian	774	3,589	4.6
Norwegian	3,185	15,106	4.7
Danish	618	2,983	4.8
Italian	1,167	5,660	4.9
Bohemian	2,398	12,102	5.0
Finnish	312	1,657	5.3
Russian	656	3,574	5.4
Canadian French	2,875	16,225	5.6
Polish	1,476	9,080	6.2
Other foreign parentage	1,132	4,826	4.3
Negro	663	2,051	3.1

For the native whites, of native parentage the average number of children per married woman was only 2.7; for the whites of foreign parentage it was 4.4. According to these averages ten women of native American stock had in the aggregate given birth to 27 children, while ten women of foreign stock had given birth to 44.

Of the various foreign nationalities distinguished in the table the Poles were the most prolific, the women of Polish parentage who were in the second decade of their married life having had an average of 6.2 children each. The Canadian French rank next, with an average of 5.6, and then the Russians

and Finns, with an average of 5.4 and 5.3, respectively. At the other extreme are the Scotch, Canadian English, and English—none of them, however, with an average as low as that for the native American stock. Of course these figures should not be understood as representing or indicating the average number of children to which the women who marry give birth in the course of their married lives. That average might be either larger or smaller than the average here given because, on the one hand, many of the women here considered will bear more children before their married lives are terminated and, on the other hand, many women who marry never reach the second decade of married life and therefore bear fewer children on the average than the women here considered.

In the following table the women of the various nationalities who have borne children are classified with respect to the number of children, into three classes: (1) Those having one or two children, (2) those having from 3 to 5 children, and (3) those having had more than 5 children. The foreign parentage classes have been arranged in the ascending order with respect to the percentage having more than 5 children, that percentage indicating the relative prevalence of large families. The results exhibit a wide range of variation. Of the Polish women enumerated in the second decade of married life, 60.9 per cent. had borne more than 5 children; of the English and English Canadians, only 18.5 per cent. The latter is the lowest percentage for any of the foreign races as distinguished in the table. But much lower than this is the percentage for the native white women of native parentage, of whom only 9.9 per cent. had borne more than 5 children.

Class.	Women under 45 Years of Age Married 10 to 20 Years.								
	Total Number Tabulated.	Number Bearing				Per Cent. Bearing			
		No Children.	1 or 2 Children.	3, 4 or 5 Children.	More than 5 Children.	No Children.	1 or 2 Children.	3, 4 or 5 Children.	More than 5 Children.
All classes	78,432	5,775	18,197	32,496	21,964	7.4	23.2	41.4	28.0
White—native parentage	15,953	3,097	6,348	5,926	1,582	13.1	39.8	37.2	9.9
White—foreign parentage	61,816	3,541	11,646	26,386	20,243	5.7	18.9	42.7	32.7
Canadian English	1,340	118	401	580	250	8.7	29.8	43.0	18.5
English	5,352	480	1,636	2,247	989	9.0	30.5	42.0	18.5
Scotch	1,209	115	322	528	244	9.5	26.6	43.7	20.2
Welsh	764	40	187	380	157	5.2	24.5	49.7	20.6
Swedish	3,373	159	630	1,643	941	4.7	18.7	48.7	27.9
German	23,003	1,082	4,672	10,259	6,990	4.7	20.3	44.6	30.4
Swiss	858	50	151	386	271	5.8	17.6	45.0	31.6
French	329	29	58	135	107	8.8	17.7	41.0	32.5
Hungarian	1,011	73	136	449	353	7.2	13.5	44.4	34.9
Irish	9,975	779	1,698	4,008	3,490	7.8	17.0	40.2	35.0
Austrian	774	40	118	328	288	5.2	15.2	42.4	37.2
Italian	1,167	57	137	535	438	4.9	11.7	45.9	37.5
Norwegian	3,185	140	470	1,358	1,217	4.4	14.8	42.6	38.2
Danish	618	25	91	257	245	4.0	14.8	41.6	39.6
Bohemian	2,398	60	246	1,091	1,001	2.5	10.3	45.5	41.7
Finnish	312	15	30	119	148	4.8	9.6	38.2	47.4
Russian	656	17	48	260	331	2.6	7.3	39.6	50.5
Canadian French	2,875	143	327	882	1,523	5.0	11.3	39.7	53.0
Polish	1,476	37	75	465	899	2.5	5.1	31.5	60.9
Other foreign parentage	1,132	82	213	476	361	7.2	18.9	42.0	31.9
Negro	663	137	203	184	139	20.7	30.6	27.7	21.0

In the table below the several classes are ranked first with respect to the percentage having children and then with respect to the percentage having more than five children. It might be said that in the one case the various classes are ranked with respect to their tendency to have any children and in the other with respect to their tendency to have many children or large families. The two rankings show some striking differences. The Germans, for instance, have a rather high rank (6th) as regards their tendency to have some children but a rather low rank (14th) as regards their tendency to have many children. The same thing may be said of the Swedes. The Irish, on the other hand, have a rather low rank (15th) as regards the tendency to have some children but a much higher rank (10th) as regards their tendency to have large families. Of the Germans 95.3 per cent. had had children and 30.4 per cent. had had more than 5 children; of the Irish 92.2 per cent. had had children and, at the same time, 35 per cent. had had more than 5 children. As regards the percentage having children the Canadian French and Italians are in practically the same class, the percentages being

Rank.	Ranked with respect to—			
	Tendency to Have Any Children.		Tendency to Have Many Children.	
	Class.	Per Cent. Having no Children.	Class.	Per Cent. Having More than 5 Children.
1	Bohemian	97.5	Polish	60.9
2	Polish	97.5	Canadian French	53.0
3	Russian	97.4	Russian	50.5
4	Danish	96.0	Finnish	47.4
5	Norwegian	95.6	Bohemian	41.7
6	German	95.3	Danish	39.6
7	Swedish	95.3	Norwegian	38.2
8	Finnish	95.2	Italian	37.5
9	Italian	95.1	Austrian	37.2
10	Canadian French	95.0	Irish	35.0
11	Austrian	94.8	Hungarian	34.9
12	Welsh	94.8	French	32.5
13	Swiss	94.2	Swiss	31.6
14	Hungarian	92.8	German	30.4
15	Irish	92.2	Swedish	27.9
16	Canadian English	91.3	Negro	21.0
17	French	91.2	Welsh	20.6
18	English	91.0	Scotch	20.2
19	Scotch	90.5	Canadian English	18.5
20	American (white)	86.9	English	18.5
21	Negro	79.5	American (white)	9.9

95.0 and 95.1, respectively; but the percentage having more than 5 children is 53.0 for the Canadian French, as compared with 37.5 for the Italians.

Still another index of fecundity may be derived from these data by ascertaining the ratio of the number of years married to the number of children borne, or the average number of years married per birth. This figure is obtained by computing the aggregate number of years married in the case of each group of women covered by the tabulation and dividing that aggregate by the total number of children. The same figure would be obtained by dividing the average number of years married by the average number of children if these averages were exact. But as here given they are approximate, being carried out to only one decimal place; therefore they do not always give the same quotient as is obtained by using the totals as the basis of the computation.

Adding one married life to another, the 78,432 women included in this tabulation represented in the aggregate 1,108,721 years of married life—possibly an appalling figure, but one which of course has no value or significance except as a step in the computation. It represents an average married life of 14.1 years per woman. As the aggregate number of children to whom these women had given birth was 317,747, the average number of children per woman was 4.1 and the number of years of married life per child, 3.5. The latter figure may be defined as the child-bearing rate that had been maintained by the women included in this tabulation, consisting of women under 45 married from 10 to 20 years. The table which follows gives this rate for each of the several parentage classes distinguished in the tabulation. The white women of native parentage had had one child every 5.3 years; the white women of foreign parentage, one every 3.2 years. For the several nationalities of foreign origin the rate ranged from 4.2 for the women of English parentage to 2.3 for those of Polish parentage. For the latter and also for the women of Canadian French, Finnish, and Russian parentage the average interval between births was less than half what it was for the women of native American parentage.

Class.	Women under 45 Years of Age Married 10 to 20 Years.			
	Total Number Tabulated.	Average Number of Years Married.	Average Number of Children Borne.	Average Number of Years Married per Child Borne.
All classes	78,432	14.1	4.1	3.5
White—native parentage	15,953	14.2	2.7	5.3
White—foreign parentage	61,816	14.1	4.4	3.2
English	5,352	14.4	3.4	4.2
Canadian English	1,349	14.0	3.5	4.0
Scotch	1,209	14.2	3.6	4.0
Welsh	764	14.0	3.8	3.7
French	329	14.3	4.3	3.3
German	23,003	14.2	4.3	3.3
Irish	9,975	14.1	4.4	3.2
Swedish	3,373	13.6	4.2	3.2
Swiss	858	14.2	4.4	3.2
Hungarian	1,011	13.6	4.5	3.0
Austrian	774	13.5	4.6	2.9
Danish	618	14.1	4.8	2.9
Italian	1,167	13.9	4.9	2.9
Norwegian	3,185	13.9	4.7	2.9
Bohemian	2,398	14.0	5.0	2.8
Canadian French	2,875	14.6	5.6	2.6
Finnish	312	13.8	5.3	2.6
Russian	656	14.1	5.4	2.6
Polish	1,476	14.0	6.2	2.3
Other foreign parentage	1,132	14.2	4.3	3.3
Negro	663	13.9	3.1	4.5

The figures which have been presented afford no exact measure of the difference between the several classes as regards either birth rate or natural increase. Birth rate involves several factors which are here left out of account. It is affected not alone by the difference in the rate at which children are born during a given number of years of married life, but also by the age at which women marry and by the varying length of the period during which they continue to bear children. It is probable that some of the foreign parentage classes marry younger than the women of American parentage, that they begin having children earlier in life, and continue to have them later in life. To that extent the figures here given understate rather than exaggerate the contrast in the fecundity of the native as compared with the foreign stock. But on the other hand it is equally probable, in fact, practically certain, that the death rate and particularly the infant mortality is greater for the foreign than for the native stock, and that the ratio of children "raised" to children born is accordingly

less for the former than for the latter. To that extent the figures here presented exaggerate rather than understate the differences between the several classes as regards the natural rates of increase.

Mention has been made of the fact that the tabulation as applied to the women of foreign parentage distinguished between women who were themselves foreign born and native women whose parents were foreign born, the two subclasses being designated as the first and second generations, respectively. The following table presents separate data for each of these subclasses under each foreign parentage class. In some cases the representatives of the second generation were very few, because the immigration is of so recent origin that the second generation has not had time to grow up. In case of the women of Italian parentage, for instance, the tabulation included only 13 women of the second generation as compared with 1,154 of the first. Of Finns there were none in the second generation. In case of the Germans and the Irish, on the other hand, who represent an older immigration, the women of the second generation outnumbered those of the first. Where the number is very small, as it is in the case of second generation of Italians, the results of the tabulation can hardly be accepted as typical, and for that reason no rates have been shown. It is a question whether in two or three cases where rates are given the numbers are not still so small as to make the results of somewhat doubtful value; but in general the representation is sufficient to afford a safe basis of comparison.

Whether the test is the average number of children, or the average number of years married per child borne, or the percentage of women bearing more than 5 children, the comparison for every foreign parentage class almost without exception indicates a lower fecundity for the second generation than for the first. In this respect at least the second generation manifests varying degrees of assimilation to American standards. The difference between the two generations is much more marked in some parentage classes than in others. It is more marked for the Germans, the Scotch, and the English than it is for the Irish, the Norwegians, or the Canadian English. As a rule the women of the second generation had been

married a small number of years on the average, a circumstance for which, of course, allowance must be made in a comparison of the average number of children, or of the percentage of women having more than 5 children. This circumstance, however, would have little effect on the comparison of the child-bearing rate as measured by the number of years married per child borne. Among the classes of foreign extraction the one which had the lowest fecundity rate according to this test was the second generation of English—one child every five years. This approaches the American standard of one child every 5.3 years. Next to the second generation of English comes the second generation of Scotch—one child every 4.7 years. The highest degree of prolificness is that indicated for the first generation of Poles—one child every 2.3 years. The first generation of Canadian French had had one child every 2.5 years; the Italian first generation and also the Norwegians of both generations had borne children at the rate of one every 2.9 years.

It may be noted, however, as a fact of significance that the proportion of women having no children is not invariably larger for the second generation than for the first. On the contrary, in the case of the Canadian English, the Canadian French, the Danes, the Norwegians, the Poles, the Swiss, and the Welsh the percentage of childless women was smaller in the second generation than in the first. That is to say, relatively more women of the second generation had had children, although they had had relatively fewer children. This suggests that the tendency of the second generation as compared with the first is not so much in the direction of no families as it is in the direction of small families.

Nationality as Determined by Nativity of Parents.	Women under 45 Years of Age Married 10 to 20 Years.					
	Total Number Tabulated.	Per Cent. Bearing no Children.	Per Cent. Bearing More than 5 Children.	Average Number of Years Married.	Average Number of Children.	Average Number Years Married per Child Borne.
All classes	78,432	7.4	28.0	14.0	4.1	3.5
White—native parentage	15,953	13.1	9.9	14.2	2.7	5.3
White—foreign parentage	61,816	5.7	32.7	14.1	4.4	3.2
First generation	37,788	5.3	37.9	14.2	4.7	3.0
Second generation	24,028	6.3	24.6	14.1	3.9	3.6
Austrian	774	5.2	37.2	13.5	4.6	2.9
First generation	706	5.1	38.9	13.5	4.7	2.9
Second generation	68	5.9	19.1	13.3	3.9	3.4
Bohemian	2,398	2.5	41.7	14.0	5.0	2.8
First generation	2,044	2.4	43.9	14.2	5.2	2.8
Second generation	354	2.8	29.1	13.1	4.4	3.0
Canadian-English	1,349	8.7	18.5	14.0	3.5	4.0
First generation	1,052	8.8	19.2	14.1	3.5	4.0
Second generation	297	8.4	16.1	13.5	3.3	4.1
Canadian-French	2,875	5.0	53.0	14.6	5.6	2.6
First generation	2,349	5.1	55.6	14.7	5.8	2.5
Second generation	526	4.4	41.1	13.8	4.9	2.9
Danish	618	4.0	39.6	14.1	4.8	2.9
First generation	578	4.2	40.8	14.2	4.9	2.9
Second generation	40	2.5	22.5	12.6	4.2	3.0
English	5,358	9.0	18.5	14.4	3.4	4.2
First generation	3,575	8.3	22.4	14.5	3.7	3.9
Second generation	1,777	10.3	10.7	14.2	2.9	5.0
Finnish	312	4.8	47.4	13.8	5.3	2.6
First generation	312	4.8	47.4	13.8	5.3	2.6
Second generation	.....	....	....	....	....	....
French	329	8.8	32.5	14.3	4.3	3.3
First generation	95	8.4	35.8	14.3	4.5	3.2
Second generation	234	9.0	31.2	14.3	4.2	3.4
German	23,003	4.7	30.4	14.2	4.3	3.3
First generation	10,203	3.9	39.2	14.3	4.9	2.9
Second generation	12,800	5.4	23.4	14.1	3.9	3.6
Hungarian	1,011	7.2	34.9	13.6	4.5	3.0
First generation	996	7.3	35.2	13.6	4.6	3.0
Second generation	15	*	*	*	*	*
Irish	9,975	7.8	35.0	14.1	4.4	3.2
First generation	4,492	7.4	40.8	14.2	4.8	3.0
Second generation	5,483	8.1	30.2	14.1	4.2	3.4

Nationality as Determined by Nativity of Parents.	Women under 45 Years of Age Married 10 to 20 Years.					
	Total Number Tabulated.	Per Cent. Bearing no Children.	Per Cent. Bearing More than 5 Children.	Average Number of Years Married.	Average Number of Children.	Average Number of Years Married per Child Borne.
Italian	1,167	4.9	37.5	13.9	4.9	2.9
First generation	1,154	4.9	37.6	13.9	4.8	2.9
Second generation	13	*	*	*	*	*
Norwegian	3,185	4.4	38.2	13.9	4.7	2.9
First generation	2,299	5.0	39.7	14.0	4.8	2.9
Second generation	886	2.8	34.3	13.7	4.6	2.9
Polish	1,476	2.5	60.9	14.0	6.2	2.3
First generation	1,411	2.6	61.9	14.1	6.2	2.3
Second generation	65	1.5	38.5	13.0	5.1	2.6
Russian	656	2.0	50.5	14.1	5.4	2.6
First generation	643	2.5	51.3	14.1	5.5	2.6
Second generation	13	*	*	*	*	*
Scotch	1,209	9.5	20.2	14.2	3.6	4.0
First generation	899	8.9	23.2	14.3	3.8	3.8
Second generation	310	11.3	11.6	13.9	2.9	4.7
Swedish	3,373	4.7	27.9	13.9	4.2	3.3
First generation	3,108	4.6	28.7	13.6	4.3	3.2
Second generation	265	6.4	18.9	13.2	3.6	3.6
Swiss	858	5.8	31.6	14.2	4.4	3.2
First generation	440	6.6	35.7	14.1	4.7	3.0
Second generation	418	5.0	27.3	14.2	4.1	3.5
Welsh	764	5.2	20.6	14.0	3.8	3.7
First generation	393	5.9	26.0	14.3	4.1	3.5
Second generation	371	4.6	14.8	13.8	3.4	4.0
Other Foreign	1,132	7.2	31.9	14.2	4.3	3.3
First generation	1,039	7.0	32.1	14.3	4.3	3.3
Second generation	93	9.7	30.1	13.9	3.8	3.6
Negro	663	20.5	21.0	13.9	3.1	4.5

*Not computed, owing to small number involved.

The statistics compiled by this investigation give some indication of the effect of environment upon fecundity, since the data, as previously explained, are presented for five different areas or localities, comprising the state of Rhode Island, the cities of Cleveland and Minneapolis, and rural sections in Ohio and in Minnesota. The following table facilitates a comparison of fecundity in the several areas, by showing the percentage of women of the specified classes bearing no children, the percentage bearing more than 5 children, the average number of children per woman, and the average number of years married per child borne. The proportion of the women here considered bearing no children was largest in Rhode Island (11.3 per cent.) and smallest (3.0 per cent.) in rural Minnesota. The percentage having more than 5 children was practically the same in Rhode Island, Cleveland, and rural Ohio, being in each case about 26 per cent.; in Minneapolis it was 18.5 per cent.; in rural Minnesota, 40.7 per cent. In Rhode Island the average number of children borne by the women included in the tabulation was 3.8; in Cleveland and also in rural Ohio it was 4.0; in Minneapolis, 3.5; in rural Minnesota, 5.0. The average number of years married per child borne was 3.8 in Rhode Island, 3.5 in Cleveland, 3.6 in rural Ohio, 4.0 in Minneapolis, and 2.8 in rural Minnesota. It is perhaps somewhat surprising that in this comparison rural Minnesota should represent the extreme of large families while Minneapolis represents the extreme of small families. But doubtless these results are largely affected by the difference in the composition of the population as regards race or nativity. Probably a better index of the effect of locality is afforded by the percentages and rates given for the whites of native parentage as a separate class. For this class the average number of children is almost the same in Rhode Island (2.5) as it is in Cleveland (2.4) and in Minneapolis (2.4), and is exactly the same in rural Ohio as it is in rural Minnesota (3.4). In the rural sections of Ohio and Minnesota, however, the women of native parentage had had an average of one more child than the women of the same class in the cities of Cleveland and Minneapolis and the state of Rhode Island. The comparison is indicative of the effect of urban conditions

in restricting fecundity. The number of years married per child borne brings out a similar contrast. In the urban population as here represented the number of years of married life

Classes.	Women under 45 Years of Age Married 10 to 20 Years.				
	Total Number Tabulated.	Per Cent. Bearing no Children.	Per Cent. Bearing More than 5 Children.	Average Number of Children.	Average Number of Years Married per Child Borne.
All classes	78,432	7.4	28.0	4.1	3.5
Rhode Island	19,302	11.3	26.9	3.8	3.8
Cleveland	17,569	8.1	26.7	4.0	3.5
Minneapolis	9,116	8.5	18.5	3.5	4.0
Selected rural counties in Ohio	19,062	5.2	26.0	4.0	3.6
Selected rural counties in Minnesota	13,383	3.0	40.7	5.0	2.8
White—native parentage	15,953	13.1	9.9	2.7	5.3
Rhode Island	6,133	17.5	9.2	2.5	5.9
Cleveland	3,104	15.2	6.3	2.4	5.9
Minneapolis	2,469	12.7	5.9	2.4	5.7
Selected rural counties in Ohio	2,508	5.7	16.8	3.4	4.1
Selected rural counties in Minneapolis	1,439	5.1	14.9	3.4	4.2
White—foreign parentage	61,816	5.7	32.7	4.4	3.2
Rhode Island	12,809	8.0	35.4	4.5	3.2
Cleveland	14,230	6.3	31.4	4.3	3.2
Minneapolis	6,600	6.9	23.3	3.8	3.6
Selected rural counties in Ohio	16,235	5.1	27.6	4.5	3.5
Selected rural counties in Minnesota	11,942	2.7	43.8	5.2	2.7
First generation	37,788	5.3	37.9	4.7	3.0
Rhode Island	9,603	7.2	37.8	4.7	3.1
Cleveland	10,132	5.5	37.6	4.7	3.0
Minneapolis	4,641	6.5	25.9	4.0	3.4
Selected rural counties in Ohio	6,293	4.6	34.2	4.6	3.1
Selected rural counties in Minnesota	7,119	2.6	49.6	5.5	2.6
Second generation	24,028	6.3	24.6	3.9	3.6
Rhode Island	3,206	10.5	28.1	3.9	3.6
Cleveland	4,098	8.5	16.1	3.3	4.1
Minneapolis	1,959	7.9	17.2	3.4	4.0
Selected rural counties in Ohio	9,942	5.5	23.4	3.8	3.7
Selected rural counties in Minnesota	4,823	2.8	35.2	4.7	2.9
Negro	663	20.5	21.0	3.1	4.5

per birth for the women of native parentage was almost 6; in the rural sections it was a little over 4.

The figures for the women of foreign parentage also show some noteworthy contrasts, the highest degree of fecundity for this class being found in rural Minnesota, the lowest in Minne-

apolis; but as between Cleveland, rural Ohio, and Rhode Island there are no very marked differences either in the average number of children per woman or the average number of years married per birth for this class. The composition of the foreign parentage class as regards race or country of origin differs greatly in these different localities and no doubt affects the results of the comparison.

In each of the localities covered by this tabulation the statistics indicate a greater fecundity for the women of foreign parentage than for those of native parentage.

The above comparisons suggest the necessity for a word of caution as regards accepting the totals obtained in this tabulation as typical of conditions in the United States as a whole. It is evident that conditions vary widely in different sections. In the totals included in this limited tabulation the urban element has a much greater weight than it would have in the total population of the United States. Of the total number of women for whom data are here presented 34 per cent. lived in the two cities of Cleveland and Minneapolis, and 24.6 per cent. in the state of Rhode Island which is largely urban, while only 41.4 per cent. lived in the rural counties of Ohio and Minnesota. Of the women of native parentage included, only about 27 per cent. lived in the rural counties of these two states. Of the total population of the United States, 53.7 per cent. is classed as rural in the census report of 1910; and of the native white population of native parentage 63.9 per cent. is rural. The state of Rhode Island comprises less than 1 per cent. of the total population of the United States but includes about one fourth of the total number of women here tabulated and about two fifths of the white women of native parentage. It would not, therefore, be safe to assert on the basis of the data here presented that white women of native parentage in the United States under 45 years of age and married 10 to 20 years have had on the average only 2.7 children, have borne children at the rate of one child every 5.3 years, and that 13.1 per cent. of them have had no children. Statistics covering the entire United States would not improbably indicate a greater degree of fecundity for the whites of native parentage than the figures here cited, which include no representation from the South

and only a relatively small representation of the agricultural section of the Middle West. Probably the figures given for Rhode Island are fairly typical of conditions in New England and through the manufacturing sections of the Middle Atlantic states; Cleveland and Minneapolis may be regarded as more or less typical of large cities with a large foreign element; and the rural counties included may be accepted as representing the agricultural Middle West. As regards the white women of native parentage, totals for the entire United States, if obtained, would probably give rates and percentages intermediate between those for the rural sections and those for Cleveland, Minneapolis, and Rhode Island.

Certain general conclusions, however, may be safely based upon this investigation; it shows that white women of native parentage are much less prolific than those of foreign parentage, and affords a statistical measure of the difference between these classes living side by side, in the communities covered by the tabulation; it shows that there is a wide range of variation as between different races or nationalities of foreign origin, and indicates their relative rank as regards fecundity; it shows also that the second generation of foreign origin is less prolific than the first generation although more prolific than the whites of native parentage; and finally it affords a measure of the extent to which urban conditions have restricted fecundity, an effect particularly striking in the case of the whites of native parentage.

THE PERMANENT CENSUS BUREAU: A DECADE OF WORK.

By John Cummings, *United States Bureau of the Census.*

The Secretary of Commerce and Labor in his annual report for the year 1902–03 noted certain benefits anticipated by him as likely to be realized in the service of the Bureau of the Census operating as a permanent office. In his brief statement covering the operations of the Bureau during its initial year a policy was outlined which clearly distinguished the functions of the new from those of the old census office. Among the services to be rendered by the new bureau, aside from improvement of the decennial census, is mentional that of collaborating with the many state bureaus engaged severally in similar lines of statistical work. Attention is called to the fact that the Secretary had himself approved a request from the Civil Service Commission "that the Bureau of the Census shall compile the statistics of the classified service of the United States." Important branches of statistical work,—such as compiling annually the statistics of cities of 30,000 or more inhabitants,—are specified as having been already devolved upon the permanent Bureau, and the intention is declared of transferring to that bureau from time to time other important work. The Secretary then continues as follows:

> Heretofore there has been no bureau of the government to which such distinctive and exclusive functions could be assigned, and the quality and the value of our governmental statistics have suffered correspondingly in comparison with those of other nations. But with this conception of the true function and the proper development of a permanent Census Bureau it will necessarily become, in a comparatively short time and under proper direction and management, the great statistical laboratory of the United States government, worthy to take rank with the best statistical offices maintained by European governments.

On the termination of the Thirteenth Census period the Bureau of the Census rounded out its first decade of existence as a permanent office.

Since practically all of its more important periodical reports are either decennial, quinquennial, biennial, or annual, a decade is a natural period of life for the Census Bureau. During any decennial it is normally required under the law to exercise all of its various functions. Normally in such a period it completes the report of one decennial census, and organizes and conducts the field work and compiles the general reports of another. With the record of one such period complete, the question may fairly be put—Has the Bureau become in fact a "great statistical laboratory," undertaking, perfecting, and coördinating the statistical work of the Federal Government, and collaborating with state and municipal bureaus and other agencies of statistical inquiry throughout the country? To what extent has it become the prime statistical office of the country,—a permanent administrative agency of coöperation, standardization, and original inquiry?

The establishment of the Bureau upon a permanent footing was the achievement of more than half a century of agitation. A select committee of the House, which had had under consideration a memorial on the errors of the Sixth Census (1840), presented by a committee of the American Statistical Association, reported on June 17, 1844, that they knew of no way of avoiding such errors in future censuses "so easy and practicable as by the establishment of a bureau of statistics." Secretary of the Treasury Bibb, in a letter to Congress dated January 6, 1845, specified the publication of the census as one of the functions of the bureau of statistics which he urged should be created, and the creation of such a bureau was during that year made the subject of two Congressional reports. In the Compendium of the Seventh Census, Superintendent DeBow urged the necessity of having "machinery in advance at the seat of Government," as a condition of taking the census properly.* Various committees, officials, and superintendents of the Census in the decades following repeatedly urged upon

*"Unless there is machinery in advance at the seat of Government no census can ever be properly taken and published. There is a peculiar education required for these labors which neither comes from zeal nor genius, but is the result only of experience. They are the most irksome and trying imaginable, requiring inexhaustible patience and endurance, and baffling almost every effort after accuracy. Long familiarity can alone secure system, economy and certainty of result. This office machinery exists in all European countries where statistics are the most reliable, but there has been none of it in the United States. Each census has taken care of itself. Every ten years some one at Washington will enter the hall of a department, appoint fifty or a hundred persons under him, who, perhaps, have never compiled a table

Congress the advisability of making the office permanent, and the American Statistical Association and the American Economic Association finally united in memorializing Congress.

Improvement of the decennial census is the motive chiefly in evidence in all of this agitation, and this function is the one commonly thought of even at the present time, as constituting the *raison d'être* of the Bureau. Nevertheless other advantages than the improvement of the decennial census, to be derived from the services of a permanent bureau were clearly defined. The House committee reports of 1844 and 1845, in fact, recommend the creation of a bureau which shall not only take the decennial census, but shall coördinate the statistical work of the Federal Government in every department, and shall embrace within its publications statistics relating to foreign countries. In one conspicuous instance several decades later, also, the policy advocated was not that a permanent census office be created, but that the taking of the census be devolved upon an existing permanent bureau, namely the Bureau of the Statistics of Labor in the Department of the Interior. This policy was advocated by General Walker in 1888 with reference especially to the Eleventh Census. The condition fundamentally essential to improvement of the census was that it be taken by an organized, permanently operating bureau.

Writing in 1900 Professor Willcox clearly differentiates the two distinct functions of such a bureau by drawing an industrial analogy as, on the one hand, a sort of statistical accounting or bookkeeping, and on the other a periodical statistical stock-taking. A highly organized government would provide for the continuous registration of social phenomena, and for the periodical census of social conditions. Having pointed out that there was in the United States no means of determining the healthfulness of the country at different times, or the natural increase of population, or the facts relating to the

before, and are incapable of combining a column of figures correctly. Hundreds of thousands of pages of returns are placed in the hands of such persons to be digested. If any are qualified it is no merit of the system. In 1840 returns were given out by the job to whoever would take them. In 1850, such was the pressure of work, that almost anyone could at times have had a desk. Contrast this with the English system and reflect that one individual, as hereafter remarked, presided over the census of 1801, '11, '21, and '31. In Washington, as soon as an office acquires familiarity with statistics, and is educated to accuracy and activity, it is disbanded, and even the best qualified employee is suffered to depart." Compendium of the Seventh Census, p. 18.

institution of marriage,—such as age at marriage, proportion marrying, duration of the union, the prevalence of divorce,—no means of determining whether "any specific kind of crime, such as drunkenness, forgery, or rape, is increasing or decreasing," Professor Willcox concludes that "the only feasible means of securing these ends in the near future is through a close and continuous coöperation between state or municipal registration offices and some statistical department of the Federal Government," and that "such a statistical department must be permanent; and, therefore, the *sine qua non* of securing these ends is a permanent statistical office at Washington, empowered to work towards them."*

Whatever the achievement of the permanent Bureau during the first decade, whether creditable or discrediting, there is no flaw in the argument which was made for its establishment. The programme of action was clear in its prescriptions, and the legislation under which the Bureau undertook that programme left it free to exercise judgment in devising ways and means of achieving results. The permanent Bureau must, therefore, stand by the record which it has made. Even today, however, after a decade during which its activities have been diverse, and its specific functions multiplied to a degree which could not have been foreseen, it is still regarded generally, one might almost say universally, as a bureau which is maintained permanently for the purpose of taking a census decennially. Permanent maintenance for the performance of a function periodically, however important that function, is a stigma which is fundamentally discrediting to any public office. The truth or falsity of this conception as regards the permanent Census Bureau ought in fairness to be determined.

During the four years past the Bureau has been in fact so largely occupied with the Thirteenth Census work that its functions as a permanently operating statistical office have necessarily been more or less subordinated, and indeed to a certain extent suspended. During this period the Bureau has to a certain extent resumed its original character as a bureau organized for the purpose of taking the decennial

*Quarterly Journal of Economics, August, 1900.

census, and naturally criticism, favorable and unfavorable, of the Bureau and interest in its work have centered chiefly in the reports of the last great decennial count of population, of national resources and of the equipment of industry and agriculture. The volume of criticism elicited by the performance of the permanent Bureau during this crucial period of its existence bears witness at least to the importance of this one function which it is called upon periodically to perform. The decennial census has been called the "greatest single piece of work" undertaken by the Government, but prior to the taking of the Thirteenth Census, the Bureau had operated as a statistical office for a period of seven years, and by legislative requirement it will in future decades operate during seven out of each ten years as a general statistical office of the Federal Government. How these seven years are spent is certainly a matter of consequence, and improvement of the decennial census is very far from being a sufficiently definite programme for a bureau which publishes in the course of a decade, besides the main reports of the decennial census, other reports, bulletins, and miscellaneous publications aggregating some 40,000 pages, and expends in each of the seven years during which it operates as a permanent office, on work other than that connected with the compilation of the decennial census reports, some $1,200,000 or $1,400,000 of public money —a sum of money sufficient to provide for all the running expenses of a city of 100,000 inhabitants, or of one of our larger universities.

It may be assumed as fairly obvious that there is some advantage in a permanent bureau which provides "a nucleus for the great force which must be employed during the decennial census periods," but it is decidedly unfortunate that the notion should prevail so generally as it does, that providing a nucleus is the chief justification for permanent maintenance. Unfortunate, not only because it leaves out of account the important services of the Bureau from year to year, but more especially because providing a nucleus for the great decennial count would not in itself be any justification whatever for permanent maintenance. The difficulties in the way of organizing to take the decennial census though greatly les-

sened are certainly not avoided by permanent maintenance. The permanent Bureau can, it is true, provide supervision and a nucleus of experienced clerks, but even so the force which takes, and to a great extent the force which compiles the decennial census is an emergency force of supervisors, special agents, enumerators, and clerks, inexperienced in the work for which they are specially appointed. On the advent of the Thirteenth Census there was a permanent staff and a force of approximately 600 clerks in Washington, but the field work of that census was done by some 70,000 inexperienced enumerators, working under inexperienced supervisors. To provide for editing the schedules and compiling the data it was necessary to increase the force of clerks in Washington to more than five times the number on the rolls of the permanent office. To organize this great army and bring it into the field for a few days of active service is one of the most perplexing problems with which the Bureau is confronted, and it would seem that some radical change of policy will be necessary to insure greater accuracy and completeness in the returns—possibly some such change as has been advocated by a former Director in connection with the agricultural census of 1915, who has proposed employment of the mail carriers as enumerators.*

Although it is practically certain that any census in the future will be better taken by a fully equipped, permanently operating statistical office with a trained force of experts available for supervision, than it would be by a force altogether temporary and inexperienced, nevertheless the justification for permanent maintenance must ultimately be found if at all in the work done by the office in its character as a permanent bureau. If this other work of the permanent Bureau is casual, a sort of statistical fly-flapping without practical social value in itself, its continuance can not be justified by the exigencies of the decennial census, and the Bureau itself had best be abolished,—even though its abolition might somewhat impair the quality of the decennial census, or prevent any material improvement in that work. It is at least doubtful if a permanent force of clerks sitting in Washington for seven years without serious employment, would at the end of that seven

*See Dr. Durand's Article in this number, p. 12.

years be found efficient for active work either in the field or in the office. It would certainly not be impossible to carry out the constitutional provision ordering a count of the population once in ten years, and even to go far beyond the provisions of that simple mandate, by employing some other agency of the government less expensive than a bureau maintained permanently for the performance of a function intermittently.

In some of the criticism which has been directed against the Bureau during the past year there has been in evidence the implication that during the seven years intervening between July 1, 1902, and June 30, 1909, the Bureau of the Census has marked time, trifling with its own records, or with records found elsewhere, or possibly with records made for want of anything better to do,—gathering data of an inconsequential sort primarily for the sake of having data to tabulate, and edit; and the further implication is that the Bureau will continue in the same futile activity during the coming years. The idea seems to be that except for this make-work employment, the Bureau's great equipment for tabulating data relating to population, agriculture, and industry will, generally, during the seven-year intervals between the decennial census periods gather dust, while clerks and officials grow weary with waiting. For seven years the Bureau's most strenuous employment will be a sort of futile hammering away upon a statistical log with the back of the axe, an exercise maintained somnolently in order to prevent absolute degeneration against the period when for three years there is some real statistical wood to be chopped. During these long periods of suspended function and animation, the Bureau will be permitted to exist on suffrance. For seven hours each day its corps of experts will maintain, behind vigilant doorkeepers, a futile and sleepy guard over tons of dusty records which may not be opened to the public, and whose very bulk seems to preclude any use being made of them; and promptly at 4.30 o'clock each day the functions of the Bureau and of all its experts will be complacently resigned to the night watchman.

The theory that a competent force of experts and clerks could be retained under any such conditions from one census to another is of course absurdly erroneous. Men of the type

needed would be the very first to leave upon the termination of the census period—assuming what is not very probable, that competent men could be secured for the decennial census work. Those who would stay on would be those who could not get away, and the process of selection for the permanent force would necessarily be one of weeding out the fit and retaining the unfit. Demotions incidental to the reduction of the force to a permanent basis—at the close of the Thirteenth Census period there were 185 demotions—and the prospect of futile employment would scatter the trained force of the Bureau.

The intercensal activities of the Bureau absolutely determine the character of its working force. If these activities are trivial, the Bureau itself will always be found incompetent to undertake the decennial census. Unless, therefore, there is concrete evidence that the Bureau has become during the first decade of its existence a "great statistical laboratory," it has failed to qualify even for performing the one function which is generally regarded as its distinguishing character. The concrete evidence must lie in the work done by the Bureau as a permanent Bureau. A very brief summary account of this work may, therefore, be given. Such a review might seem unnecessary for readers of the JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION, but even among them there will be some—perhaps many—who do not realize the diversity of scope and the importance of the work which has been done by the Bureau of the Census since its establishment in 1902 as a permanent office.

The publications of the permanent Bureau include—besides the Thirteenth and several important volumes of the Twelfth Census, prepared wholly or in part by the permanent Bureau, —more than a score of reports or series of annuals, which with two exceptions present compilations of original data gathered in the field. These reports embrace the Census of Manufactures, 1905 (in four volumes); the report on Marriage and Divorce: 1867–1906 (in two volumes); annual reports of Mortality statistics, covering the years 1900–1910; annual reports of Statistics of Cities having a population of over 30,000,

covering the years 1905–1910; and special reports covering—Benevolent Institutions, 1904; Electrical Industries, 1902; (Central Electric Light and Power Stations, Street and Electric Railways, Telephones and Telegraphs), 1902; same, 1907; Express Business in the United States, 1907; Fisheries of the United States, 1908; Insane and Feeble-Minded in Hospitals and Institutions, 1904; Mines and Quarries, 1902; Paupers in Almshouses, 1904; Prisoners and Juvenile Delinquents in Institutions, 1904; Religious Bodies, 1906 (two volumes); Transportation by Water, 1906; The Blind and the Deaf, 1900. The two reports which do not represent field work are the report presenting statistics of Women at Work (based upon the schedules of the Twelfth Census), and the report entitled "A Century of Population Growth from the First Census of the United States to the Twelfth, 1790–1900."

In addition to these formal reports the Bureau has issued a series of 116 bulletins, some of which are advance or summary publications of compilations and text subsequently included in its complete reports, but many of which represent independent compilations. Among these may be mentioned the bulletins giving the annual statistics of cotton production which have been collected and compiled each year by the Bureau for fourteen consecutive years. These bulletins now cover the production of cotton in foreign countries as well as in the United States, presenting each year complete statistics of acreage, crop, stock, amount ginned, etc. To secure these data the Bureau maintains a field force of over 700 special agents who send in to the Bureau during the season ten reports from each gin in the country, stating the amount of cotton ginned. Upon the basis of these reports and in addition to its annual summaries of production, supply, and distribution the Bureau compiles and gives to the press ten reports each year showing the amount of cotton ginned to date. Other bulletins have presented statistics relating to child labor in the United States; commercial valuation of railway operating property; earnings of wage earners; insular and municipal finances, and mineral and electrical industries of Porto Rico (three bulletins); estimates of population; executive civil service of the United States; geographical distribution of the population; age sta-

tistics; illiteracy; industrial districts; irrigation in the United States; municipal electric fire alarm and police patrol systems; Negroes in the United States; proportion of children and of sexes in the United States (two bulletins); supervisors districts for the Thirteenth Census; statistics of teachers; statistics of cities of 8,000 to 25,000; and vital statistics of the Twelfth Census,—besides a large number of advance and summary bulletins relating to such topics as mortality, financial and general statistics of cities of 30,000 and over, manufactures in 1905, electrical industries, and marriage and divorce.

During the decade the Bureau has compiled and tabulated the returns and published and distributed the completed report of the Census of the Philippine Islands, taken by the Philippine Commission in 1903. This report (printed in English and in Spanish) comprised four volumes, covering in its text and tables, the geography and history of the Islands, as well as the statistics of population, mortality, defective classes, education, families, dwellings, agriculture, and of social and industrial conditions. The Bureau has also compiled and published the census of Cuba, taken by the provisional government in 1907. In 1907 the Bureau took a census of the population of Oklahoma and Indian Territory, the results of which are published in Census bulletin No. 89. In coöperation with the Forest Service of the Department of Agriculture, it has issued yearly statistics of forest products. It has published a series of volumes based upon the records of the First Census ("Heads of families—First Census of the United States: 1790." One volume for each state). It has prepared and published a number of valuable pamphlets relating to such subjects as the registration of births and deaths, the classification of causes of death, census methods, collaboration in federal and state statistical work, and uniform municipal accounting. Beginning with 1907, the Bureau has compiled and published biennially the Official Register of the United States, which is a list of the persons employed in the civil service of the federal government. The Register for 1907 and that for 1909 each take the form of two quarto volumes—that for 1909 covers an aggregate of over 1,500 pages. The Register for 1911, which does not cover the Postal Service, is in one quarto volume of 878 pages.

It should be borne in mind that the formal reports, with very few exceptions, and many of the bulletins, represent original compilations of data gathered in the field. They are not, except in a few instances, based upon earlier reports or upon records on file in the Bureau. Each annual report of Mortality Statistics, for example, is based upon transcripts of certificates of death which are sent in to the Bureau from month to month from every registration office included in the territory known as the registration area. The volume compiling this data for the year 1910 is a carefully indexed quarto of 611 pages,—the 1909 volume contains 810 pages. The collection and compilation of data and the preparation of the final reports covering Mortality statistics for both of these years—1909 and 1910—was necessarily carried on during the "census period," *i. e.*, the period in which the Bureau was compiling and publishing the Thirteenth Census returns.

Similarly, in its series of annual reports giving statistics of cities the Bureau has each year compiled data taken directly from municipal records for each city of 30,000 or more inhabitants—in 1910 there were 184 such cities to be covered. Some of these reports are confined to statistics of financial transactions of municipal governments, their indebtedness and assets, and assessed valuation of taxed property, while other reports include what are denominated "physical or general" statistics,—relating to sewers, refuse disposal, highways, parks, police, and kindred subjects. The report for 1910 is a quarto of 308 pages. The work of collection and compilation of these data also, as well as of the data relating to mortality and to cotton production, and the preparation of the Official Register, was carried on during the census period.

But it should not be inferred that the supplementary studies based upon data gathered at the Twelfth and at prior censuses though less numerous are less valuable than are the reports of independent investigations. One argument for the establishing of the permanent Bureau was that it would make possible "careful and scientific study of the main and secondary results of the decennial enumerations." The records of the Census Bureau represent the expenditure of many millions of dollars. They are, without doubt, the most valuable records in existence of the industrial, agricultural, political and social

development of the country from the initiation of the government down to the present time. Each new census extends this record over another interval of time, and gives added significance to the records of the past. The social, economic, and political development of each decade imposes a new significance upon these records, which did not pertain to them at the time they were made, and could not have been foreseen. New questions are involved in the changing conditions disclosed at each decennial enumeration. To a very great extent the data gathered at any given census acquires significance only when comparisons are run back over past decades. The number of inhabitants, the population living in urban communities, the amount of accumulated wealth, the amount and value of the equipment and of the products of agriculture and of manufactures, the wages and hours of labor, the number of women and children working as breadwinners, the number of children at school, the number of illiterates,—stated as absolute numbers, values or quantities pertaining to some given year have in themselves no dynamic significance. As isolated facts the most refined and accurate statistics of natality, mortality, marital condition, criminality, racial amalgamation, or the data relating to any other demographic characteristic of the population are as meaningless as words read from a dictionary. A statistical account of any social tendency must embrace the past with the present, and it will always be necessary in the face of new social problems to review the records of the past. However complete the report of any census may be at the time of its issue, it begins from the very date of its issue to become incomplete because social conditions are constantly changing, and these changes are constantly creating new interests. Probably no fact seemed of less significance to those who were making up the returns of the First Census,—that of 1790,—or to those who compiled these returns and published them in a little octavo of 52 pages, than the names written down by the marshals in making their canvass. But even these names have come to have a significance, sufficient to warrant their publication in a series of volumes. An adequate interpretation of the returns made at any census necessarily involves a review of past records and frequently requires

a new compilation of data scattered through voluminous reports, or an original compilation from the schedules of data which have never been taken off.

The primal general reports of the census tabulate the returns by schedule inquiries. The statistics relating to Population are presented under such headings as number of inhabitants, race, nativity, parentage, sex, age, marital condition, illiteracy, and occupation. The subjects or chapters in the reports on Agriculture and on Manufactures, also reflect the schedule inquiries. But to develop the real import of the census returns, wherever they bear upon a social condition—and practically all of the census data have such a bearing—requires an entirely different assembling of the data. The economic efficiency of large as compared with that of small industrial corporations; the efficiency and earnings of labor engaged in agriculture as compared with the efficiency and earnings of labor engaged in manufactures; the utilization and introduction of power in industrial processes as a substitute for manual labor; the growth of urban communities; the absolute and the relative depopulation of rural districts; the decreasing rate of growth of the population; and many other equally important topics, each require for any adequate treatment an assembling of census data differing entirely from that followed in the first tabulations, which of necessity are made up mechanically directly from the schedules and are presented in separate reports covering respectively Population, Agriculture, and Manufactures. The first tabulation of the returns in the volumes which constitute the census Report under the law must always uncover conditions which will require a new assembling of the data. The bare fact of rural depopulation, for example, is developed in the first tabulation of the population returns; but the significant data of agriculture and of industrial development in urban communities which bear directly upon, and to a great extent explain this phenomenon, are not brought together in any one place or considered in relation to this fact. Some of this work of recombination and further analysis can be done outside the Bureau by private individuals, but much of it requires the services of the equipment of a statistical office, and much of it

requires a review of records which are not open to the private investigator.

It will be obvious to one at all familiar with practical statistical work that a bureau whose reports are so numerous and so diverse in character, as are those of the permanent Census Bureau, must at any given time be advancing work from the initial stage of preparing schedules and collecting data to final publication on a large number of inquiries. For any given report a certain amount of preliminary work is required before the field work can be undertaken; the field work itself may occupy months; the editing of the schedule returns, the compilation of the data, and the final preparation of tables and text for the printer may, as is conspicuously true of the decennial census, extend over years. The work on the several reports is thus generally overlapping. It follows that a list of the Bureau's publications for any one year does not indicate the diversity of the Bureau's activities during that year. An account of the work undertaken, advanced or completed by the Bureau and of its miscellaneous activities as a general statistical office in any one year gives, therefore, a fairer idea of the diversity of functions which it is at any given time performing.

During the first year of its existence as a permanent office, the Bureau was largely occupied with compilation of data gathered at the Twelfth Census. "As a matter of fact, the permanent office was largely engaged for more than a year in finishing the Twelfth Census work. The four expensive volumes, Employees and Wages, the Supplementary Analysis, the Statistical Atlas, and Occupations, together with the revised edition of the Abstract, were all compiled and published subsequent to the reorganization of the Bureau as a permanent office."* In this first year the posting sheets of the Twelfth Census were revised for filing as permanent records in the office, and records and schedules of the Eleventh Census, which had been transferred to the Bureau from the Department of the Interior were indexed. A special investigation was made reviewing the results of the census of Agriculture in 1900 "to

*S. N. D. North. Annual Report of the Director of the Census for the year 1907–08

ascertain if methods can not be devised for shortening the time required for tabulating and presenting the results." The special report on Employees and Wages in manufacturing establishments, which was completed in this year, compiled data gathered on special schedules from a large number of manufacturing establishments, showing the number of employees receiving specified daily, hourly, and weekly rates of pay, the returns upon which this report is based being actual transcripts from pay-rolls. A preliminary bulletin was issued on Street and Electric Railways, covering a total of 987 companies from which schedules were secured, presenting in detail "the description of the physical equipment of each railway; also the capital stock, funded debt, cost of operation, maintenance, income," etc. Field work of the Census of Mines and Quarries was going on in coöperation with the United States Geological Survey—returns being received from 22,061 mines and quarries. Field work for the special report on Electric Light and Power Plants was completed, covering returns from 3,741 plants; and a related inquiry on Police Patrol and Fire Alarm Telegraphs was conducted, reports for 704 cities being received and prepared for tabulation. The report on Telephone and Telegraph Companies also was under way. Collection of statistics of quantity of cotton ginned in the United States from the crop of 1902 was made by 626 special agents in as many counties throughout the cotton ginning states. Three cotton bulletins were issued during the cotton ginning season. The official list of 32,753 gins was perfected and three reports were secured from each of these gins, making a total to be compiled of 92,844 reports obtained by personal visits to each gin. The Director stated that "the Census Office was enabled by its perfected machinery to give the public an accurate and final statement of the size of the crop of 1902 . . . five months earlier than this important information had ever before been available from any commercial source." Work was in progress on the report relating to Wealth, Debt, and Taxation—the scheme of the report being planned, schedules prepared and the collection of data begun. The report on Irrigation undertaken "to complete and bring up to date of the crop year 1902 the

statistics relating to irrigation," covering "area of the land reclaimed, the cost and value of the work, and such other information as can be obtained bearing upon the present condition of irrigation" (H. R. Res. 182, Fifty-seventh Congress), was "nearly completed."

The initial work carried on during this year in the division of Vital Statistics, under the Acts of March 3, 1899, and March 6, 1902,—in which provision is made for the collection of annual statistics of births and deaths within such areas as in the judgment of the Director provide adequately for registration,—was so important in its immediate and its ultimate consequences, and is to such an extent illustrative of the spirit of coöperation and social service which has characterized the activities of the Bureau in other branches of its work, that a portion of the Director's account of it may be quoted.

In conjunction with the committee on demography of the American Public Health Association, a circular was prepared outlining the essential features of an effective law for the registration of deaths, as a guide for future legislation; the "international classification of causes of death," recommended by the International Congress of Hygiene and Demography, and adopted by most of the registration states and cities was recommended for the annual reports, and a manual was prepared and published giving a description of the titles and a complete index covering nearly 2,000,000 cases reported at the censuses of 1880, 1890, and 1900, showing under which title each case reported should be compiled.

To enlist the support and assistance of the prominent organizations most interested in these statistics, resolutions were prepared and presented to the American Public Health Association, and were adopted. The American Medical Association and the conference of state and provincial boards of health approved the movement begun by this office to promote the extension of registration and to secure uniformity in results, and committees were appointed by each of these bodies to coöperate with this office and with each other for the same purpose. A resolution was also drafted and presented to Congress approving the movement and requesting the favorable consideration and action of state authorities "to the end that the United States may attain a complete and uniform system of registration." This resolution was adopted by Congress and was approved by the President, February 11, 1903.

The Census Office then issued a pamphlet entitled "Legislative Requirements for Registration of Vital Statistics." This was sent to the governors of all states which do not have effective laws on the subject, and elicited numerous replies indicating a purpose to recommend legislation.

Three other pamphlets designed to advance the movement for uniformity were prepared and have been published by this office: "Practical Registration Methods," designed for the instruction and use of local registrars, to 5,280 of whom it was despatched; "The Relation of Physicians to Mortality Statistics," sent already to 66,714 physicians; and "Medical Education in Vital Statistics," sent to every medical college and school in the country.

In consequence of this movement for uniformity most of the registration states and many of the cities have already adopted the "standard certificate"; many others have expressed their intention of adopting it, together with other suggestions as to improvement in methods, as soon as practicable. In several states amendments to existing laws that will have a most beneficial effect have been secured in accordance with suggestions made.

In the meantime the collection of data for the annual reports, through transcripts of the registration records, has been carried on.

* * *

The returns for the calendar year 1900 were all in hand at the beginning of the year, and work upon the report for this year was commenced early in July, 1902. These returns have been compared for duplications, transfers have been made, the cases edited, and the cards punched. Excluding stillbirths, which are not compiled as deaths, the number of deaths represented is 539,939. . . .

* * *

A complete card index, including cross references of causes of death, classified in accordance with the international classification, was prepared for reference in future cases. This list comprises 22,152 cards, and makes 435 pages of closely typewritten matter.

In the Geographer's division the work of correcting civil boundaries on the Bureau's maps, to conform to current local changes was carried on. This work, it may be noted, is continuous throughout the intercensal period, and is a necessary preparation for the decennial enumeration. In this Division also work already noted was in progress on the Statistical.

Atlas of the United States at the Twelfth Census, and a tabulation was made of data relating to earnings of enumerators' at the Twelfth Census.

Up to the close of this year there had been distributed from the Mailing Division of the Census Office a total of 3,592,638 copies of advance bulletins, an average of approximately 11,000 copies of each volume of the final Report of the Twelfth Census, and about 25,000 copies of the Abstract.

If in some years the work of the Bureau has become less diverse, it has on the whole, throughout the period, tended to increase rather than to decrease in volume and in complexity.

During the year ending June 30, 1909, the last year of operation on a permanent footing under the Permanent Census Act, and immediately prior to the expansion of the Bureau under the act of July 2, 1909, for the purpose of taking the Thirteenth Census, the Bureau issued 26 publications aggregating 3,970 pages. Of these, ten are characterized by the Director as important reports and 16 were bulletins and pamphlets. During the year the Bureau made 420 requisitions for printing and binding upon the Public Printer. Although in this year the several divisions of the Bureau—Population, Manufactures, Agriculture, and Revision and Results—were "engaged largely in preparatory work for the Thirteenth Census," the returns of the census of Cuba were tabulated, the report on Marriage and Divorce, and that on Religious Bodies were completed; also reports on Express Business, Electrical Industries in Porto Rico, Telegraph Systems, Forest Products, and Industrial Districts; preliminary reports covering Central Electric Light and Power Stations, Street and Electric Railways, Telephones, and of the census of Fisheries (taken in coöperation with the Bureau of Fisheries) were published. Statistics of developed water power were compiled in compliance with an Executive Order for use of the National Conservation Commission; statistics of pulp and paper for the House committee on pulp and paper investigation; statistics of manufactures for the House Ways and Means Committee; and a tabulation of the financial statistics of banks was made for the National Monetary Commission. For the first time an attempt was made to tran-

scribe statistics of births as well as of deaths. The Official Register for 1909 contained 64,000 more names than that for 1907. Work on the regular annual reports was of course carried on coincidently.

The annual reports issued by the Bureau have become more comprehensive, and each year the field to be canvassed in them tends to expand in area and in population. The number of cities covered by the annual report on Statistics of Cities of 30,000 or more inhabitants, for each of which the Bureau compiles data each year, has increased from 154 in 1905 to 184 in 1910. The registration area has been extended from year to year and the number of deaths reported and tabulated has increased from 545,533 in 1905 to 805,412 in 1910. The annual report of Mortality for 1905 was a quarto of 354 pages; that for 1910, as already noted, a quarto of 611 pages. In the first year during which the Bureau tabulated statistics of cotton production, it received from each of its 626 special agents in the field, three reports of cotton ginned; in 1912 it received 10 reports from 742 agents working over a more extended area. With the growth of population and area, the number of minor and of major civil divisions increases, and in consequence an increasing number of changes in civil boundaries must be recorded each year, to keep the census maps up to date. Each year the Official Register carries a larger number of names. The number and size of institutions and of manufacturing establishments and enterprises covered by the censuses of manufactures, industries, and institutions, taken between the decennial enumerations is constantly increasing. The demand for more frequent censuses of population has been insistent for years, and a quinquennial census of agriculture has already been authorized by Congress.

Although at the Thirteenth Census new inquiries were in fact added to the schedules, the necessity for unloading and simplifying the decennial census schedules is fully realized. Very few of the inquiries carried on these schedules can, however, be dropped. The tendency is, on the contrary, to increase rather than to decrease the number and scope of statistical inquiries required by legislation to be made in the course of any given decade. The old inquiry carried on the decennial

census population schedule as to number of deaths during the census year, for example, has been supplanted by the regular collection of mortality data by the Bureau from month to month throughout the decade. The social statistics of cities so elaborately covered at the census of 1880, is to a certain extent represented by the Bureau's annual reports of Statistics of Cities. In the case of one important crop (cotton) data are published at intervals of approximately two weeks and summarized annually. More frequent reports regarding other crops and live stock on farms may be required. It has long since become obvious that no satisfactory or accurate data regarding such social phenomena as unemployment can be secured by simply including an inquiry upon the decennial census schedule. Annual production of wealth, rates of wages of men and women at work, hours of labor, and many other subjects, might probably better be made the subjects of special inquiries made at regular intervals independently of the decennial census, or even of continuous collection such as is now maintained regarding mortality, and—by other agencies than the Census Bureau—regarding prices of commodities. Such a development in the future would be entirely consistent with the policy which has been followed since the establishment of the permanent Bureau. As already noted the permanent Bureau has during the past decade taken a census of Mines and Quarries (1902); of Electrical Industries (1902 and 1907); of Wealth, Debt, and Taxation (1903); of Institutions (1904); of Manufactures (1905); of Religious Bodies (1906); and of Fisheries (1908) independently of the decennial census.

As regards the necessity for unloading the decennial census schedules, and the advisability of distributing the work of independent inquiries through the decade, the opinion expressed in 1888 by General Walker,—who superintended the census of 1870 and that of 1880,—is significant, especially in view of the fact that the census of 1880 was in some respects, of all the decennial censuses, the most comprehensive in its scope. "What is eminently to be desired," wrote General Walker, "in the interests of our statistical service is that the census should be confined to an enumeration of population, coupled only with one other class of statistics, to be hereafter

mentioned, [*i. e.*, statistics relating to Agriculture, because "it would be inexcusable to require the entire surface of the United States to be gone over a second time, on foot or on horseback,"] such an enumeration to be conducted once in ten years, as now, or better, once in five years, as befits so great and rapidly growing a people; while the remaining statistical inquiries now connected with the census, and even many others required to meet the increasing demand for exact knowledge, should be set on foot and conducted in proper succession by the same bureau of the Government during the intervals of the decennial or quinquennial censuses."*

To a very considerable extent this policy of distributing inquiries through the decade has been followed, in prescribing the work of the permanent Bureau and it is not improbable that a further unloading of the decennial census schedules, resulting in a further distribution of work through the decade will seem advisable in the future.

Although its publications during this first decade of its existence represent diverse statistical inquiries of wide scope, the Bureau of the Census has nevertheless been constantly in the position of being unable to undertake other statistical work for which the need has been pressing—such for example, as the compilation each year from local records of the data relating to marriage and divorce, the compilation of judicial statistics relating to crime and juvenile delinquency, and statistics relating to savings institutions and insurance. Many fields of statistical inquiry which are covered by statistical bureaus in certain states and in foreign countries are still uncovered for the country as a whole. While every effort has been expended to bring about greater uniformity in the work of state and municipal bureaus which are from time to time conducting similar inquiries, it must always be true of statistical work done by independent state bureaus that it will be incomplete as regards area of the country covered at any given time, and that as regards any specific inquiry the data gathered in one state will be more or less incomparable with that gathered in another. However valuable the reports of local bureaus may

*Quarterly Journal of Economics, January, 1888.

be as intensive studies providing statistical data in full detail for local areas, such bureaus can not by any practical scheme of coöperation institute nation-wide inquiries,—partly because in the case of any given inquiry there would be a considerable number of states in which no bureau or agency existed for undertaking the collection of data; partly because of legislative prescriptions and limitations under which the state bureaus severally operate; partly because of varying local interests; but primarily because of the lack of any means of centralized administrative control. Such inquiries must be achieved if at all, by a federal bureau which would naturally seek in every state to avail itself to the fullest extent possible of the services of state and municipal bureaus. In a number of instances the Bureau of the Census has in its field work during the past decade collaborated with state bureaus and has thus not only effected economies for both the state and the federal government, but has also secured the services of experts entirely familiar with the local conditions. The possibility of further collaboration with state bureaus would seem to be one of the most promising for improvement and extension of statistical work in the United States and the character of the Census Bureau, as an office for effecting coördination of statistical work throughout the country is one of its most important characters.*

A word may be permitted with reference to the time occupied in the preparation and completion of the more comprehensive reports of the Bureau, especially of the decennial census reports.

*No implication is intended here, that the physical equipment of the Census Bureau has been utilised to its full capacity throughout the decade. The physical equipment of the Bureau is necessarily determined by the requirements of the decennial census. It must be adequate for the tabulation of the decennial census returns within the period legislatively described. This equipment is not fully utilised during the intercensal years, and it is, therefore, largely available for other work. A more continuous and complete utilization of the Bureau's equipment would make it possible for the federal government materially to improve and extend its statistical work in many directions. It would be aside from the purpose of this article, however, which is confined to work which has been done by the Bureau during the past decade to undertake any outline of other important work which might be devolved upon the Bureau. Some of the services which have been in the past rendered by the Bureau under special instructions, such as the tabulation of data relating to employees in the civil service, might be made a regular function. The collection of annual statistics relating to marriage and divorce, under provisions similar to those under which statistics of births and deaths are collected has been suggested by the Director. The need for collection annually or at regular intervals, of judicial statistics relating to crime is generally recognised. In the administration of the income tax law valuable data relating to incomes will undoubtedly be recorded which might be well worth compiling annually. Important data relating to immigrants and to emigrant aliens are now constantly in process of collection at the ports, and are summarized in a simple tabulation in the annual report of the Commissioner of Immigration. If, however, the facts relating to each immigrant

It may be proposed as a fairly established principle of statistical experience that within reasonable time limits any given report will in its nature be final in proportion to the time occupied in compiling it.

The main reports of the decennial censuses are valuable chiefly as depositories of raw material, but this material is often of such mass and so disposed through ponderous volumes in the primal tabulations as to be more or less unavailable for practical use. Moreover in these primal tabulations the full significance of the returns is not in fact determined, nor can the significance of the data in many important respects be extracted from these first tabulations by any possible manipulation of the figures.

It does not follow that the legislative requirement that the decennial census report shall be published within approximately two years of the enumeration is unwise or unreasonable, but the consequences of this requirement should be fully appreciated. Although the original primal tabulations may be made up into volumes and published as the main Report of the Census, the Bureau will always carry forward on the termination of the decennial census period a considerable amount of work to be undertaken or completed, as supplementary to the primal compilations, and "essential to a perfect census."

In his report covering the operations of the permanent Bureau during the year 1902–03, Director North called attention to the fact that, although the provisions of the law requiring publication of the results of the Twelfth Census on or

and to each emigrant alien, such as race, sex, age, country of birth, mother tongue, occupation, literacy, port of entry, and of clearing, length of residence in the United States, destination, etc., were punched out upon a census card, it would be possible to make the tabulation covering each year, much more complete and significant. The expense involved—additional to that incurred in the present tabulation—in securing this complete tabulation would be inconsiderable, but—in view of the importance of the subject and the money expended in getting the data,—even if considerable, it would be entirely justifiable. The statistics of immigration relating to the year 1903–04 were in fact tabulated by the Bureau of the Census. The complete tabulation of the data which are constantly accumulating incidentally to the administration of public offices, federal, state, county, and municipal, would be a work equal in importance to the decennial census work itself. There is obviously an immense amount of statistical accounting of this sort, which ought to be undertaken by the federal government. Again, it may be suggested as a possible line of work that data relating to school children might be collected annually, under direction of the Commissioner of Education in coöperation with local authorities, by distributing schedules prepared by the Commissioner to teachers at the beginning or end of each year. The data returned upon these schedules, relating to each child at school showing age, sex, studies, physical condition, etc., might be so compiled by the Census Bureau, as to determine each year the character of the school population of the country, and such a tabulation would be of great social significance.

before July 1, 1902, had been substantially complied with, a complete compilation and publication prior to that date, of "a great deal of valuable and interesting data collected in accordance with the law" (viz., the law providing for the Twelfth Census) was "physically impossible." As a matter of fact the permanent Bureau was more or less occupied with the compilation and publication of data collected "in accordance with the law" at the Twelfth Census, for several years following the termination of the census period—some of this work being in progress as late as 1905–06. The report on Women at Work "presenting statistics of women 16 years of age and over reported at the Twelfth Census as having a gainful occupation" was transmitted May 20, 1907. Even so, some important compilations and tabulations of data gathered "in accordance with the law" at the Twelfth Census—of the data relating to fecundity of married women, for example, were not undertaken at all.

Completeness in statistical work is wholly relative, absolute completeness being in fact as difficult of attainment as eternal life, and it would be a simple matter to demonstrate mathematically that a complete tabulation of the data gathered at any census—in any literal sense of the word complete—is not only a physical impossibility within the census period but would be physically impossible of achievement within a much longer period. This will be apparent if one considers for a moment some of the simple inquiries upon the schedules. In its primal editing of the population schedule for 1910 the Bureau has distinguished provisionally some eight or nine thousand gainful occupations—the exact number not being determined. These are returned from some 70,000 enumeration districts, by industry, sex, age, marital condition, literacy, nativity, parentage, country of birth of the foreign born, state of birth of the native, and by other characteristics. To show for these primal occupation groups a few simple characteristics such as, for example, sex, general nativity and parentage, even for such large areas as states, would run the tabulation into thousands of pages—the number of pages required can not be easily estimated, but might very well require two large quarto census volumes. To make a similar showing

for each of the 229 cities having in 1910, 25,000 or more inhabitants would extend the tabulation through several more volumes. Other volumes would be required to make a complete tabulation by age and still other volumes to show marital condition, country or state of birth, year of immigration, literacy, etc., *ad infinitum*. The impossibility of showing such detail even for large areas such as states or cities of 25,000 as a whole, for 1910 alone, is obvious without considering smaller areas such as counties or wards of large cities, or comparisons of the returns for 1910 with those for 1900 and earlier census years. It must be borne in mind that Occupation is one of 33 inquiries carried by the population schedule in 1910, and that a complete tabulation of the returns by occupations such as is indicated above would leave 32 other inquiries to be taken up. The returns for Manufactures and for Agriculture, and those relating to dependent, defective, and delinquent classes are susceptible of tabulations equally extensive and detailed.

As an applied science in one of its aspects, statistics might be defined as the science of avoiding this sort of completeness, but it would of course be much more adequately defined as the science of securing, while avoiding insignificant detail of tabulation, a completeness of tabulation calculated to give to the data in hand point and bearing upon social conditiors and problems. The essential incompleteness of any tabulation of what may be called the first differences developed from the schedule returns is obvious, and even though the machines are so wired up as to obtain from the first runs of the cards important secondary differences,—such as marital condition by sex and age,—the tabulation based upon these runs, especially under conditions of publication which require the results of one run to be set in type while succeeding runs are in progress, must be regarded as primal and not as final. They reflect the schedule, but are only incompletely assembled with reference to social phenomena, such as rural depopulation, fecundity, race amalgamation, or child labor. The returns are in a sense tabulated, having been taken off the schedules, but they have not been interpreted. Interpretation of the data, as distinct from a tabulation of schedule returns which reflects schedule inquiries, requires a new wiring up of the machines, supple-

mentary runs of the cards as they have been sorted in the first runs, and new compilations of the machine totals of these first runs themselves.

It is safe to say that no census report in the future will completely compile and tabulate the returns for any census year, either within or subsequent to the census period, and it would be exceedingly foolish for the permanent Bureau ever to undertake a complete compilation in any strained sense of the word "complete." The degree of completeness to be achieved, in any given direction, both within and subsequent to the census period is a matter of judgment, guided by the general principle that the degree of completeness must not be carried beyond the point determined entirely with reference to practical utility, and when it is stated with reference to the Twelfth Census that the work of compilation and publication of the data collected "in accordance with the law" was "physically impossible" within the census period, and that the work of completing the Report continued for several years subsequent to the census period, no overrefined or strained sense is put upon the word, "complete." The incompleteness specified is precisely incompleteness with reference to practical utility. As has been noted,the supplementary reports of the Twelfth Census include some of the most important of the volumes which must be regarded as organically constituent parts of the Twelfth Census Report, and which are, page for page, of greater and more permanent value than the volumes of the main report itself. These volumes were issued by the permanent Bureau as supplementary reports, and by such a distinction it will always be possible to comply with the law and issue a Report of the Census practically within the census period or immediately thereafter.

While, however, certain volumes—namely, those completed, and containing certain technical data relating to Population, Agriculture, and Manufactures,—may always be issued near the end of the census period as constituting the main report, experience at past censuses, including the Thirteenth, justifies the prediction that the main reports so constituted will not embrace a tabulation of the data as complete as that which Congress and the public generally will be perfectly justified in requiring of the Bureau as a result of the very considerable expenditure of public money.

Before the distinction between main and supplementary reports was devised, on the institution of the permanent Bureau, the publication of the census extended over varying periods. "The final volume of the census of 1850—the report on Manufactures—did not appear until 1859. A number of volumes of the census of 1860 were six years in preparation. The census of 1870 was completed within three years, but that of 1880 occupied nearly five. The last volume of the 1890 census appeared in 1897."* As already noted, if one disregard the nominal distinction between "reports" and "supplementary reports" the Twelfth Census was still issuing in 1905–06 and even in 1907.

Improvements in the processes and machinery of mechanical tabulation may considerably expand the physical possibility of work within the census period, but over against this may be put the growth of population and the consequent increase in the number of minor and of major civil divisions, the development of manufactures and of agriculture and the consequent increase in number of establishments and farms, and finally the possibility of further elaboration of schedules in some respects. Much of the necessary work done in compilation and tabulation of the census returns increases directly with population, or with number of manufacturing establishments, or farms, or institutions enumerated. It should be further noted that the area of enumeration, which in 1910 included Alaska, Hawaii, and Porto Rico, may quite possibly be extended to include the Philippine Islands and smaller outlying possessions.

Finally, it should be noted that the diverse activities of the Census Bureau are not at all adequately indicated by its publications of original reports, of supplementary analyses, and of social studies, nor can they be easily summarized in any brief statement. Throughout the whole period of its existence the Bureau has conducted an active propaganda for coöperation and collaboration in statistical work done by the numerous federal, state, and municipal statistical bureaus. It has organized and participated in conferences of state and municipal officials in charge of statistical work. It has collaborated with the state agencies in the field work of census taking. In 1904,

* The Statistical Work of the Federal Government, Julius H. Parmelee, Yale Review, 1911, p. 386.

for example, a permanent committee on uniformity of schedules and coöperative work in the Census of Manufactures of 1905, reported to the Twentieth Annual Convention of Commissioners of State Labor Bureaus, that "it appears that collaboration and coördination are possible in the collection of statistics of manufactures for the Census of 1905 in 33 states and that this work is agreeable to the officials in practically all of these states." The Bureau of the Census has collaborated also with other federal bureaus where the nature of the work to be done permitted collaboration, and has in other instances compiled and tabulated data for various bureaus, departments, and Congressional committees.

Among the more important achievements of the Bureau during the decade should be specially noted its work in the field of vital statistics. Largely as a result of its efforts, laws and ordinances have been secured providing a fairly satisfactory registration of deaths over a large area, which for the calendar year 1910 embraced 21 states and a number of municipalities in the non-registration states. The report of mortality statistics for 1910 covers 58.3 per cent. of the total population of the country. A fair beginning has thus been made in the development of vital statistics in the United States, and it is difficult to conceive how this work could have been carried forward, without some central agency interested to secure uniformity of registration methods and the adoption of standard forms conforming to international practice.

Another very important achievement of the decade, in which the Bureau has been largely instrumental has been the adoption of more or less uniform and adequate methods of accounting by a considerable number of cities. In the preparation of its reports giving financial statistics of cities, the Bureau has encountered a great diversity and laxity of accounting, which has made the work of compilation difficult and seriously invalidated the comparison of data for one city with those for another. The Bureau has been one of the important agencies working to improve and standardize the methods of accounting by municipalities throughout the country. A statement regarding the initial activities of the Bureau in this respect is made by Director North in his second annual report, in which he notes that—

. . . it was necessary for the Census to take the lead in a movement looking to greater uniformity in the accounting methods of municipalities. Accordingly, in response to the invitation of the Director of the Census, a conference was held in November, 1903, at Washington, attended by a number of representative auditors, comptrollers, expert accountants, and other students of municipal problems. . . .

Several cities have made changes in their systems of accounting, to conform wholly or in part to the classification adopted by the Bureau of the Census. Among these are New York City, St. Louis, Buffalo, Minneapolis, Atlanta, Houston, South Bend, and Lincoln. The state of Ohio has established for all its cities a uniform system of accounting in harmony with that of the Census schedules, so far as local laws permit. Cities in New York having less than 250,000 population are now required to make annual reports to the Secretary of State, of their payments and receipts. The state schedule prepared for this purpose is based upon that of the Bureau. Many cities have installed already, or have under consideration, improved accounting systems in harmony with the one above referred to. The representatives of this Bureau have met everywhere with the hearty coöperation of local officials.

Still another important line of work, of which the publications of the Bureau give only indirect evidence, had been persistently carried on for years prior to the taking of the Thirteenth Census, and was continued during the census period. This is the work directed toward the perfection of the card punching, sorting, and tabulating machines. Early in its history the permanent Bureau adopted the policy of designing and owning and in part building the machines used in tabulating the data of its reports. To this end experimental work was initiated in July, 1905. In 1907 a machine shop was equipped in the Census building at a cost of $17,483.

The perfection of certain machines unfortunately required more time than was anticipated, and the Bureau did not in every instance realize in tabulating the Thirteenth Census data all of the economies which will be possible in future census work. In the aggregate, however, the result of the machine-shop work has been material improvement in the physical equipment for tabulation. The semi-automatic machines used in tabulating the Cuban census developed a capacity for work 50 per cent. greater than that of the machines used in

tabulating the Eleventh and Twelfth decennial censuses. When in a certain line of work a machine process of securing aggregates was substituted for hand consolidation it was found by actual test that hand consolidation "requiring 36,600 hours of work, or the equivalent of three men for five years and five months, and costing $14,645, could be performed by three men using three automatic machines in 630 hours or about three months, and at a total cost of $4,382, or in about one-twentieth of the time, and for about one-third of the cost." One automatic tabulating machine devised by experts of the Bureau, differing "radically from any previously manufactured in this or any other country," developed on test a capacity for tabulating 150,000 cards in a working day of seven hours, as compared with a maximum for the hand machines of about 30,000. When working with perfect cards it is estimated that this machine—requiring two operators for each machine, or three operators for each two machines—will, as compared with the hand machines,—which require one operator for each machine—on the average handle from four to five times as many cards. In his report for the year 1910–11, figures were given by Director Durand showing the capacity of the hand and of the automatic machines as developed in five completed runs of the population cards, as follows:

The five runs together represented the handling of 343,183,-472 cards. . . . The average number of cards tabulated per operator per day on the hand machines for all of the runs combined was 16,024; on the automatic machines, 37,276. The number for the hand machines was more than double the number tabulated per operator per day at the census of 1900. On the third run of the cards, when the operators had become fully skilled, the average number tabulated per operator per day on the hand machines under piece-price payment was 21,276, and on the automatic machines (annual salary basis) 49,937. This figure for automatic machines is the average number per operator per day and not the average number per machine per day, which is larger, because more than one operator is required per machine. The number per machine per day on the third run was 84,853.

Machines formerly operated by hand are now actuated by electric power; totals which formerly were read from dials are now printed, and these totals are themselves automatically carried forward into new aggregates; the dials formerly set

back by hand, one at a time, are now all set in concert by pressing an electric button. Any simplification or speeding up of the mechanical process of handling a card or of recording a total, however slight, is multiplied into a very considerable aggregate economy of labor and time, where, as is the case in tabulating the returns of a decennial census, the equivalent of hundreds of millions of cards must be run through the machines to take off returns, and thousands of primary and secondary aggregates must be recorded.

The extent to which the mechanical processes of tabulation can be further extended, and the machines elaborated, with economy and saving of time must of course be determined in each specific case by careful experiment. The increasing cost of the census is one serious problem with which the Bureau has to deal, and it is at least within a fair degree of probability that material economies can be effected by improvements in the mechanical processes of tabulation. The machine processes are in any event more rapid, and—what is perhaps of even greater importance—the machines, which are of proved and uniform efficiency and untiring in the performance of work are themselves immediately available in emergency whenever needed. Even if there were no economy in time or cost, machine tabulation would thus have one important incidental advantage over hand tabulation, since any improvement in physical equipment which makes it possible for the Bureau to complete the tabulation of the Census data with fewer clerks taken on for short periods, and necessarily in the majority of cases inexperienced in the line of work to be done, tends to simplify one of the most perplexing of the administrative problems with which the Bureau has to deal.

It would, however, be entirely inconsistent with the experience of the Bureau during the past few years, and inconsistent it may be observed with the whole development and elaboration of machine processes in every line of industrial activity, if further perfection and elaboration of the physical equipment of the Bureau should not result in further economies and in increased efficiency. There is no reason whatever to believe that the mechanics of tabulation has arrived at the stationary state of practical perfection. General Walker declared that the United States government could well afford to pay for the

best census possible, and it may be added that it can also well afford to pay for the best equipment that can be devised by experts for compiling the census returns,—since the best census possible may be spoiled, and will under the most favorable conditions tend to become antiquated in the process of compilation.

Other activities of the Bureau might be specified which do not culminate in the publication of reports or bulletins. As a specific instance of the miscellaneous activities of the Bureau in small ways, of which no adequate account can be undertaken, the following paragraph may be quoted from the Director's letter dated June 15, 1906, transmitting the special report on the Blind and the Deaf:

> The returns collected in connection with this inquiry have not only served as the statistical basis for this report, but have been utilized to the more immediate advantage of the blind and deaf by preparing, upon request, lists of addresses and personal data for schools, libraries, and other institutions established for the benefit of these classes. Over 203 lists aggregating 42,084 names of blind persons and 29,544 of deaf have been supplied by the Bureau of the Census, and it is believed that this use of the data will contribute more directly to the personal benefit of the blind and deaf than any other that could be made.

Again, in its character as a correspondence bureau of general information, the Bureau of the Census is constantly occupied answering inquiries, official and unofficial. These inquiries rain in upon the Bureau from day to day and in answering them the same courtesy is extended to the illiterate request for data to prove—because some one has ventured to dispute the fact,—that all crime is due to some simple specified cause, as to the more reasonable requisitions by editors, public lecturers, local reformers, social workers, farmers, business men, doctors, ministers, legislators, and those engaged in preparing papers for women's clubs or for neighborhood circles. As a purveyor of general information the Bureau of the Census searches the publications of every department of the Federal government and must frequently extend its search to unofficial sources. When the resources of its own excellent library prove inadequate, it has recourse to the alcoves of the Library of Congress.

In this cursory account of the work of the permanent Census Bureau, no estimate of the scientific value of specific reports has been undertaken. During the decade the activities of the Bureau have been diverse. Its work has been broad in scope and important in character, and because it has been so and will continue to be of that character in the future, in estimating its scientific value there should be absolutely no palliation of work which is in any respect perfunctory, amateurish, or unprofessional. But even a brief summary review of the work done during its first decade can lead to but one conclusion. The Bureau has striven with such means as have been placed at its disposal to fulfil the ideal which inspired the Permanent Census Act, and its work in the aggregate is not the perfunctory work of a Bureau entirely impervious to the highest ideals of statistical science. In many respects the service and methods of the Bureau have become distinctly professional. Moreover, judging by developments of the last decade, which have each year made new demands upon the Bureau, no important line of work which has been undertaken by it will be in the future discontinued. The Bureau is rather bound to become each year, in a broader social sense, the great statistical laboratory of the United States, and it would be futile to discuss the work of the Census Bureau on any other assumption than that its work will in the future increase in scope and volume. Fundamentally, therefore, the problem of the Census Bureau is now as it has been during the past decade, that of building up a great statistical office, fully equipped and efficiently manned to perform all of its diverse functions—a professional bureau of scientific statistical research, working constantly for the improvement of statistical methods and practice in the United States, and providing the administrative agency of coöperation with state and municipal bureaus. It has been observed with reference to a great empire that "in the progress from primitive equity to final injustice, the steps are silent, the shades are almost imperceptible,"* and it is true of every sort of social change, whether of progress or decline, that the steps are imperceptible to the unaided vision of those who, as legislators or administrators,—in the face of existing conditions of infinite complexity in their

*Gibbon. Decline and Fall, XLIV.

origin and interdependence, mould public policy. To determine the direction and extent of these changes requires the survey of a long period of time. It requires accurate measurements which embrace the full detail of social phenomena, and it is the proper function of a great statistical laboratory by assembling the data of social phenomena, to make this survey, and by so doing to extend the scope and power of vision of those who are at any given time directing the trend of social forces. In the records of such a laboratory the growth of a nation is epitomized and in its current work the imperceptible changes which are taking place are accurately determined. For this service the Bureau of the Census occupies, by virtue of the cumulative tradition and legislative habit of more than a century, a unique position among statistical offices of the world. By this tradition and habit of more than a century it has been charged by the Federal Government with the conduct of statistical services more important by far than those of any other statistical office in the world—services more diverse in character, broader in their range of political, economic, and social interest, covering a greater population, involving more extensive field work and rendered throughout a longer period of years. From decade to decade the records added to its files have become more detailed and comprehensive, but in no other decade has the improvement in the statistical work of the Government been so considerable as in the decade initiated by the establishment of the Census Bureau upon a permanent footing, thus creating "machinery at the seat of Government" available not only for the decennial and for the quinquennial enumerations, but available also for that continuous statistical accounting of social phenomena which has become essential as a basis of legislation and of social amelioration. It will be freely granted—most freely by those who are or have been connected with the Bureau, that the work achieved during its first decade, when measured against the reasonable demands made upon the Government for statistical information, or even against the statistical work done in certain lines in other countries, seems pitifully inadequate. But the condition has been created, which did not previously exist, under which continuity in improvement and extension is possible.

AN EXPERIMENT IN THE COMPILATION OF MORTALITY STATISTICS.

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The compilation of accurate mortality statistics by cause of death presents many serious practical difficulties. The chief element of error lies in the inaccuracy of the statement of cause as reported, in the first instance, by the physician. We need but recall the work of Cabot,* and more recently, that of Oertel,† who point out that in the best hospitals, bedside diagnoses of even the commoner maladies often prove to be erroneous on autopsy. Thus, in Cabot's cases, where the cause had been stated as chronic interstitial nephritis, one half showed, on autopsy, no lesion of the kidney at all. As a further illustration of this error factor, we can point to numerous instances where physicians for one reason or another deliberately withhold a statement of the true cause of death when the condition is either tuberculosis, cancer, syphilis or suicide.

The second large element of error arises from the incomplete statement of cause of death through the unintentional failure of the physician to state all the morbid conditions known to him which resulted in the death. Thus, it is still customary for physicians to be content with a statement of "Acute Nephritis" as a cause of death, neglecting altogether to refer to the "Scarlet Fever" which terminated in the "Acute Nephritis." Physicians often report "Meningitis" as a cause when there has been a primary condition, such as "Whooping-Cough" or some form of traumatism antecedent to the final condition. The violences are especially subject to indefinite statement, no reference being made in many instances to such socially significant factors in the death, as homicide, suicide and the means of injury. It is the purpose of this paper to present the results of an experiment conducted by our

* Cabot, Richard C., M. D.: Diagnostic Pitfalls Identified during a Study of Three Thousand Autopsies, Journal Amer. Medical Ass'n, December 28, 1912.

† Oertel, Horst, M. D.: The Inaccuracy of American Mortality Statistics, American Underwriter, May, 1913.

office, to reduce to a minimum this important secondary element of error. After two years of operation, there has been evolved a definite routine which appears to have sufficient merit to warrant the consideration of vital statisticians.

The technical procedure is as follows: The compiling clerks engaged in classifying causes of death, carefully examine the death certificates attached to the claim papers and determine whether the statement as given by the physician is satisfactory and complete. Statements of cause presenting no difficulty are at once classified according to the International List of Causes of Death. Causes which are jointly returned are classified according to the precedents and rules of the International Committee, as best exemplified by the methods of the United States Census Bureau. Wherever the statement of cause, as given, is considered unsatisfactory for classification or where from the claimant's statement or from other sources, there is an indication of the presence of a serious condition contributing to the death, and not mentioned on the certificate, a letter of inquiry is sent to the physician asking for the additional facts.

At the beginning, we proceeded cautiously and asked only for information as to the means and character of injury in cases of ill-defined violence. We also queried "Operations" for their causes; the causes contributing to "Peritonitis," and for the location of "Cancers" and "Tumors." We asked for additional information when the terms were "Dropsy," "Heart Failure," and others of like character which are included in the designation, "Ill-defined Diseases" in the International Classification. Later, we extended our field of inquiry, and, at present, we write to physicians in the following instances:

LIST OF UNDESIRABLE RETURNS AND CHARACTER OF INQUIRY MADE.

Undesirable Returns.	*Inquiry.*
I. "Injury," "Gunshot-Wound," "Drowning," "Accidental Death," or other ill-defined violence.	Was death due to suicide, homicide or accident, and if the last, what *kind* of accident was the primary cause of death? (steam railroad, street car, fall, etc.).
II. "Operation," "Hysterectomy," "Laparotomy."	What was the cause for the relief of which the operation was performed?
III. "Peritonitis."	Was the peritonitis secondary to typhoid fever, tuberculosis? If post-operative, what was the primary cause? Suicidal? Homicidal? Accidental? If last, means of injury?
IV. "Acute Nephritis."	Kindly indicate the primary cause of the acute nephritis. Due to any contagious or infectious disease? (Scarlet fever, typhoid fever, etc.) *Directly* due to alcoholism or exposure? Traumatic? If so, means of injury?
V. "Meningitis," or "Cerebrospinal Meningitis."	Was it *epidemic* cerebrospinal meningitis? Tuberculous? Was it simple meningitis following lobar pneumonia, typhoid fever, any contagious or infectious disease? Traumatic? If so, means of injury. Suicidal, homicidal or accidental?
VI. "Paralysis."	Was the paralysis superinduced by cerebral hemorrhage? Was it a case of spinal paralysis?
VII. "General Paralysis of the Insane."	Was it luetic?
VIII. "Locomotor ataxia."	Kindly inform us whether the origin of the locomotor ataxia was luetic? Traumatic? If so, means of injury?
IX. "Progressive Paralysis."	Was this "progressive paralysis" due to a spinal lesion? Was it directly, or remotely, due to cerebral hemorrhage?
X. "Cancer," "Tumor," "Abscess."	Kindly indicate the location of the .....
XI. "Burns."	Was death primarily due to burns received in burning building? Such deaths are separately classified.
XII. Any terminal condition of uncertain origin: "Septicemia," "Convulsions," "Hemorrhage."	Kindly indicate the primary cause of the.....

In addition, we ask physicians whether serious conditions affecting the lungs, heart or kidney were involved whenever there are indications in the claimant's statement, or in our other sources of information, that such lesions contributed to the death. Claimants also often refer to the presence of "Measles," "Scarlet Fever," "Whooping Cough," when no such reference is made upon the physician's certificate. Each of these is queried.

These queries are suggested on pp. 42 and 43 of the 1909 revision of the Manual of the International List issued by the Bureau of the Census. A similar system of inquiry is maintained by a number of State Registry Offices in this country. The Registrar General of England and Wales has directed his attention to this method of improving defective statements of causes of death and has reported his experience in the annual reports of his office.

At the present time, we are querying close to 8 per cent. of the death certificates received, or about 9,200 cases in a total of 115,000 deaths per year. Our letter is a request to the physician in which we point out that the claim has been paid, and appeal for the added information on the ground of scientific interest in the improvement of vital statistics. It is a pleasure to acknowledge in this place our obligation to the many busy men throughout the country who have responded promptly and fully to our letters. In many instances, physicians have entered enthusiastically into the spirit of the inquiry and have given us a complete clinical history of the case which it would have been impossible to enter upon the death certificate. The data presented in the following tables are based upon an analysis of 5,118 replies received from physicians up to October 1st, 1913.

Table I shows the distribution of these replies according to the original assignment of cause of death, together with the number and percentage of change in classification which resulted from the inquiry:

TABLE I.

CHANGES IN CLASSIFICATION OF CAUSE OF DEATH RESULTING FROM INQUIRY TO PHYSICIANS.

International List Number.	Original Assignment of Cause of Death.	Number of Replies.	Changes in Assignment.	
			Number.	Per Cent.
020	Purulent Infection and Septicemia	59	46	78.0
045	Cancers of Organs not specified	103	79	76.7
061	Simple Meningitis	437	325	74.4
066	Paralysis without specified cause	285	259	90.9
079	Organic Diseases of the Heart	184	56	30.4
081	Diseases of the Arteries	124	69	55.6
092	Pneumonia	166	69	41.6
117	Simple Peritonitis	213	180	84.5
119	Acute Nephritis	548	227	41.4
120	Bright's Disease	184	64	34.8
154	Senility	50	25	50.0
167	Burns (conflagrations excepted)	317	54	17.0
170	Traumatism by Firearms	51	44	86.3
185	Fractures (Cause not specified)	403	365	90.6
186	Other External Violence	224	187	83.5
189	Ill-defined	145	114	78.6
	All other titles	1,625	664	40.9
	Total	5,118	2,827	55.2

It is evident from Table I that comparatively few causes contributed the largest number of the unsatisfactory assignments although virtually every title in the International List appeared in the original returns which we queried. Thus, the sixteen causes given in Table I make up 68 per cent. of the total. The largest amount of change is, moreover, found in these sixteen titles varying from 90.9 per cent. in "Paralysis," to 17 per cent. in "Burns." In all, 2,827 changes in assignment were recorded, or 55.2 per cent. of all the replies received. The value of the method for increasing the accuracy of mortality statistics should, therefore, be apparent.

Conditions of considerable medical and social interest are often masked by the undesirable titles. As in the case of "Simple Meningitis," an analysis of the replies shows that assignments were ultimately made to such definite causes as "Tuberculous Meningitis" and "Epidemic Cerebrospinal Meningitis." Similar conditions are found upon query and analysis of such indefinite titles as "Paralysis," "Peritonitis," and "Fractures." Table II (a), (b), (c), (d), shows the detailed changes in classification in the titles "Meningitis," "Paralysis," "Peritonitis," and "Fractures," respectively.

TABLE II.

CHANGES IN ASSIGNMENT OF CAUSE OF DEATH FOR THE RETURNS *"SIMPLE MENINGITIS," "PARALYSIS WITHOUT SPECIFIED CAUSE," "SIMPLE PERITONITIS," AND "FRACTURES (CAUSE NOT SPECIFIED)."*

Undesirable Term.	Changed to Title.	Number.	Per Cent. of Total.
(a) Simple Meningitis..... [Total Replies: 437]	Typhoid Fever	8	1.8
	Measles	7	1.6
	Influenza	10	2.3
	Tuberculous Meningitis	59	13.5
	Syphilis	9	2.1
	Epidemic Cerebrospinal Meningitis	92	21.1
	Bronchopneumonia	19	4.3
	Diarrhea and Enteritis	30	6.9
	Traumatism by Falling	13	3.0
	Other titles	78	17.8
	Total changes	325	74.4
(b) Paralysis without specified cause:..... [Total Replies: 285]	Syphilis	5	1.8
	Acute Anterior Poliomyelitis	38	13.3
	Cerebral Hemorrhage	188	66.0
	General Paralysis of the Insane	11	3.9
	Other titles	17	6.0
	Total changes	259	90.9
(c) Simple Peritonitis:..... [Total Replies: 213]	Typhoid Fever	8	3.8
	Abdominal Tuberculosis	17	8.0
	Diarrhea and Enteritis	9	4.2
	Appendicitis	38	17.8
	Salpingitis and other Diseases of the female genital organs	15	7.0
	Puerperal Septicemia	30	14.1
	Criminal Abortion	2	.9
	Other Titles	61	28.6
	Total changes	180	84.5
(d) Fractures: (Cause not specified.)..... [Total Replies: 403]	Traumatism by Falling	226	56.1
	Railroad Accidents	11	2.7
	Street Car and Automobile Accidents	17	4.2
	Other Vehicular Accidents	19	4.7
	Homicide by various means	9	2.2
	Other Titles	83	20.6
	Total changes	365	90.6

It is important to observe that the changes in classification noted in the preceding table agree, in the main, with the results obtained by the United States Bureau of the Census and the Registrar General's Office. Table III presents a comparison of the amounts of change in the classification of three indefinite returns for causes of death resulting from the system of inquiry in the several offices.

TABLE III.

COMPARISON OF CHANGES IN ASSIGNMENT OF CAUSE OF DEATH FOR "*SIMPLE MENINGITIS*," "*PARALYSIS WITHOUT SPECIFIED CAUSE*," AND "*SIMPLE PERITONITIS*."

Undesirable Term.	U. S. Bureau of the Census.			Registrar General's Office.			Metropolitan Life Insurance Company's Experience.		
	Number of Replies.	Number of Changes.	Per Cent. of Change.	Number of Replies.	Number of Changes.	Per Cent. of Change.	Number of Replies.	Number of Changes.	Per Cent. of Change.
"Simple Meningitis"	354	304	85.9	269	185	68.8	437	325	74.4
"Paralysis without specified cause"	235	176	74.9	1,091	854	78.3	285	259	90.9
"Simple Peritonitis"	102	79	77.5	694	408	58.8	213	180	84.5

A more detailed examination of the reports of the United States Census Bureau* and of the Registrar General's Office† shows also fair consistency both in kind and amount of change in assignment which result from inquiry. It is of interest to note, for example, that 17.6 per cent. of the "Simple Peritonitis" cases were changed into "Appendicitis" by the United States Census Bureau, 17.4 per cent. by the Registrar General's Office, and 17.8 per cent. by the Metropolitan Statistical Bureau, respectively. So, too, the United States Census Bureau returns show that 29.4 per cent. of the "Simple Meningitis" cases were changed into "Epidemic Cerebrospinal Meningitis," 34.9 per cent. by the Registrar General's Office, and 21.1 per cent by the Metropolitan Statistical Bureau, respectively.

Physicians, even to this day, are loth to report venereal diseases as causes of death. This has resulted in a decided distortion of the statistics for these causes. Thus, the returns for the Registration Area, 1911, ascribe 0.46 per cent. of the total deaths to "Syphilis" and 0.03 per cent. to "Gonococcus Infection." It is generally admitted by competent authority that these figures represent only a small part of the total deaths which should be attributed to these two causes. Our queries, especially of "Locomotor Ataxia" and "General Paralysis of of the Insane," confirm the conclusions drawn by clinicians that these important conditions are chiefly syphilitic in origin.

* Mortality Statistics, Bulletin 112, pp. 34–35.

† Seventy-fourth Annual Report of the Registrar General of England and Wales, p. XCVI.

Replies received to a recent query, subsequent to those presented above, indicate that 50 per cent. of the "Locomotor Ataxia" cases which were questioned, were luetic in origin, as were 50.8 per cent. of the cases of "General Paralysis of the Insane." These percentages, moreover, are based, in every instance, on a definite statement of a positive Wassermann reaction or on the prior admission of a syphilitic personal history by the patient.

The acute infectious diseases are often hidden under such meaningless returns as "Pneumonia," "Bronchopneumonia," "Acute Nephritis" and "Myocarditis." It is noteworthy that the inquiry method is responsible for a number of transferred assignments from the foregoing indefinite titles to such as "Scarlet Fever," "Measles," "Whooping Cough" and "Diphtheria." The communal value of added returns of this character is obvious to the progressive health officer, helping to define, as they do, the scope of his communicable disease problem.

The inquiry system outlined above is still in an experimental stage in our office routine; yet, we have already observed very definite effects from its operation upon our mortality compilations. Thus, the tabulation of our Industrial mortality for the first six months of 1913 shows that we have reduced "Ill-defined Diseases" (International List Nos. 187, 188, 189) to 0.8 per cent. of the total as against 1.4 per cent. in the tabulation for the first half of 1911. So, too, we have reduced our incidence of "Acute Nephritis" to 0.8 per cent. (1913, first half) as contrasted with 0.9 per cent. for the same period of 1911. "Meningitis" likewise shows a reduction to 0.8 per cent. (first half, 1913) from 1.0 per cent. (first half, 1911). On the other hand, our registration for "Syphilis" has increased to 0.4 per cent. (for the first half, 1913) from 0.2 per cent. of the total deaths for the first half year of 1911. We have no ground whatever for assuming that there has been a change in our actual mortality experience from the above causes, and we, therefore, assume that such changes as we have shown above are to be ascribed to the more careful methods of editing which have been instituted since the tabulation of the 1911 figures.

In the last analysis, the validity of mortality statistics must depend upon the physicians who complete the death certificates. If the fundamental data transmitted by them be erroneous, no statistical method, however efficient, will compensate for the errors involved. The vital statistician can do little or nothing to remedy the situation described by Doctors Cabot and Oertel. We must look to the medical profession itself for such improvements in pathology and diagnosis which will eliminate the crude errors so often appearing as statements of cause. The vital statisticians should, of course, give active support to all movements which will raise the standard of medical education throughout the country. They can also assist in the propaganda for increasing the number of autopsies performed in our hospitals. It is to be hoped that incorrect diagnoses on the part of physicians will be reduced before long to a minimum and the accuracy of the fundamental data of mortality statistics assured.

But the vital statistician, on his own account, must not mar the returns such as he does receive because of crude methods of compilation. He must not ignore the standard practice of criticism and classification such as is used in the leading governmental registration offices of the world. In this way, his results will be made comparable with those of other offices. He must also persistently examine his material at its source to register every item of information which may be obtainable from physicians and other persons. This he now can do. By following the suggestions outlined in this paper, registrars can at once improve the quality of their tabulations to a very significant degree. Coupled with advances in pathology and diagnosis, there should be equal progress and refinement in our statistical methods. The result of both should make mortality statistics worthy of their subject and fairly indicative of what is actually transpiring in the life of the people.

THE MOTHER TONGUE INQUIRY IN THE CENSUS OF POPULATION.

By E. A. Goldenweiser

The Thirteenth Census was the first to include in its population schedule an inquiry about mother tongue in addition to that about country of birth. The new inquiry was undertaken in response to an amendment to the act of Congress providing for the census, an amendment that was adopted considerably later than the general act, and after the schedules had been printed and the instructions to enumerators distributed. As a result the new inquiry did not have a separate column assigned to it in the schedules but was obliged to share the space assigned to country of birth returns. The occasion for the inclusion of the inquiry on "nationality or mother tongue" was a protest on the part of representatives of certain Slavic peoples who wished to be distinguished in the census statistics from the other immigrants from Austria and Hungary.

That a classification of the foreign-born purely by the political affiliations of their country of origin was not in all cases altogether satisfactory had been realized by the Bureau of the Census for a long time, and an attempt to go beyond that classification had been made in a somewhat roundabout way for the natives of several countries. In the case of Canada at each census beginning with that of 1870 a distinction has been made between Canada-English and Canada-French, regardless of territorial extraction but in accordance with language spoken which in this case largely coincides with ethnic stock. Another non-political division in the list of countries of birth was Poland, which has been shown separately at every census, 1860–1900; at the census of 1900 alone, were the natives of "Poland" divided by political affiliations, into Austrian, German, and Russian Poles. It should be noted, furthermore, that according to the instructions to enumerators in 1900, not all persons born in what had been the Polish Kingdom were to be returned as born in Poland but

only those who spoke Polish, so that this was clearly a mother tongue entry in disguise. Bohemia, which appeared as a country of birth at every census from 1870 to 1900, is another example of a province classified as a country of birth for the purpose of isolating the data for an ethnic group. While there were no special instructions about natives of this province, it is probable that the returns include under natives of Bohemia almost exclusively persons of Bohemian (and Moravian) mother tongue.

Thus it appears that for persons of Canadian origin and for two important Slavic peoples there have been published by the Census for several decades what are practically mother tongue statistics. These statistics, however, were not clearly understood because they were treated as country of birth data. The Thirteenth Census was the first to include a mother tongue inquiry as such and to make it of every foreign-born person about himself and of every native person of foreign or mixed parentage about his foreign parent or parents. The actual form of the inquiry was "What is your mother tongue or native language? What is your father's? What is your your mother's?" It should be noted especially that the inquiry as asked by the enumerators related purely to native language, and was intended to mean habitual language at home before immigration, thus containing no direct reference to nationality, ethnic stock, or "race."

It may be of interest to statisticians to consider at this time the following questions:

1. How nearly accurate are the mother tongue returns of the Thirteenth Census?
2. To what extent do they throw light on the ethnic composition of our population?
3. What are the principal new data brought out by mother tongue statistics?
4. Is it worth while to incorporate the inquiry into future census schedules?

1. A study of the returns on mother tongue convinces one that for the great majority of persons they are accurate. The chief occasion for error arose in cases where the language spoken

was distinctly different from the ethnic stock of the people. In such cases some enumerators reported language spoken while others reported ethnic stock. The principal case of this sort was for persons born in the United Kingdom. The number of persons reported as speaking Irish, Scotch, and Welsh was evidently much greater than the number in the United States who actually speak those languages, and yet, on the other hand, the numbers were not nearly large enough to cover all the natives of Ireland, Scotland, and Wales. In this case it was decided to count all of these people as English-speaking, as the large majority of them actually are, especially since information about the Irish, the Welsh, and the Scotch as ethnic units can be obtained from the data on persons born in Ireland, Scotland, and Wales. In the case of the English proper it might be said that it is fully as significant to draw a distinction between the English from Canada and the English from England, as it is to draw one between some of the closely related ethnic groups. It is true that the inquiry failed to reveal the number of persons speaking Welsh or Gaelic but this failure can hardly be considered to be a very serious matter.

Another case in point refers to Syrians. A large majority of them speak Arabic and only a few, if any, speak Syrian (or Syriac). The returns showed clearly that in many cases Syrian was entered as a mother tongue simply because the person enumerated was a Syrian by ethnic origin, regardless of the language he used. The difficulty in this case was overcome by consolidating the two languages under the head of "Syrian and Arabic," the total for the two languages being no doubt accurate.

A certain amount of confusion resulted doubtless from the fact that the English names of languages do not always correspond to their names as used by their own people. Thus the Slovaks generally call their language "Slavish." The returns for Slavish, however, could not safely be edited "Slovak" because the enumerators often put down the generic name "Slavish" without taking the trouble to find out what kind of Slavish was used. Consequently there is a considerable group of "Slavish, not specified," and the figures for some

of the specific Slavic languages are not entirely reliable. The total for all Slavs, however, is doubtless quite accurate.

2. Turning now to the question of how nearly the mother tongue statistics represent ethnic stock, we are confronted, first of all, with the case of the Jews, who frequently speak the languages of their adopted countries and would, therefore, presumably not always be found in the mother tongue class "Yiddish and Hebrew." The total number of foreign-born persons reporting Yiddish as their mother tongue in 1910 was 1,051,767; of this number 838,193, or nearly 80 per cent., came from Russia; 11.8 per cent. from Austria; 3.9 from Roumania; 1.9 per cent. from Hungary, 1.3 per cent. from England, 0.8 per cent. from Germany, and small numbers from other countries. Some idea of the adequacy of the mother tongue figures for Yiddish as measures of ethnic stock may be obtained by a comparison with the returns for incoming immigrants who were classed as Hebrews in the reports of the Commissioner General of Immigration. The following table makes such a comparison:

TABLE I

Country.	Foreign-born White: 1910.			Immigrants: 1899-1910.		
	Total.	Reporting Yiddish Mother Tongue.		Total.	Hebrew.	
		Number.	Per Cent.		Number.	Per Cent.
Russia and Finland	1,732,421	838,332	48.4	1,749,075	765,531	43.8
Austria-Hungary	1,670,524	144,484	8.6	2,322,604	180,802	7.8
Roumania	65,920	41,342	62.7	61,073	54,827	89.8
United Kingdom	2,572,123	14,061	0.5	958,375	42,896	4.5
Germany	2,501,181	7,910	0.3	377,481	7,015	1.9

The figures show that in the case of Russia and Austria-Hungary the percentage speaking Yiddish among the foreign born is higher than the percentage speaking Hebrew among the immigrants. This is easily accounted for by the fact that the Jews return to their native country less frequently than the other peoples who come from Russia and Austria-Hungary. In the case of Roumania, United Kingdom, and Germany the reverse is the case. In the case of Germany and Roumania it

is doubtless true that many Jewish immigrants report mother tongues other than Yiddish, but the numbers involved are not large. In the case of United Kingdom the difference is largely due to the fact that Jewish immigration from England is of recent origin, and that the Jews form a larger proportion of the immigration from that country during the last dozen years than they do of the total number of natives of England in the United States which of course includes a large number of earlier immigrants.

It is probable, on the whole, that the number reported as speaking Yiddish by the census, 1,052,000, is a fairly complete figure for the foreign-born Jews in the United States, and the number of those one or both of whose parents spoke Yiddish, including those who themselves spoke Yiddish, 1,677,000, is a fairly complete statement of the Jewish population of the first two immigrant generations. Beyond this the census does not attempt to go.

The other case where mother tongue is a poor guide to ethnic stock is that of the immigrants from the United Kingdom. In that case, however, as has been explained above, the country of origin figures are fairly satisfactory indices of ethnic affiliations.

For all other important mother tongues the returns are largely indicative of ethnic stocks.

3. The principal information added by the mother tongue inquiry to the existing stock of knowledge about the population of the United States is contained in the figures for the number of Yiddish speaking people and the number of persons whose mother tongue belongs to one of the Slavic group of languages. We have had, as already mentioned, some data on the number of Poles and Bohemians. The mother tongue inquiry gives in addition the number of Slavs, as a whole, and the number of Slovaks, Russians, Ruthenians, Slovenians, Serbo-Croatians, Bulgarians and Lithuanians. (The latter not strictly Slavs but closely allied to them for many centuries.)

In addition to this, and from a somewhat different point of view, the mother tongue inquiry produces material in regard to the composition of the foreign elements from each country of birth. The following table shows the percentage that the

principal mother tongue formed of the total of each country of birth.

TABLE II.

Foreign-born White, 1910.

Country of Birth.	Principal Mother Tongue.	Per Cent. of all Mother Tongues.
Ireland	English*	100.0
Italy	Italian	99.9
Wales	English*	99.9
Portugal	Portuguese	99.7
Scotland	English*	99.6
Sweden	Swedish	99.6
Greece	Greek	99.5
Mexico	Spanish	99.4
Norway	Norwegian	99.4
Denmark	Danish	98.9
Spain	Spanish	98.5
England	English*	97.6
Cuba	Spanish	97.2
Australia	English*	96.4
Netherlands	Dutch and Frisian	95.5
Bulgaria	Bulgarian	95.3
France	French	93.8
Servia	Servian	93.4
Newfoundland	English*	92.4
Luxemburg	German	92.3
Atlantic islands	Portuguese	90.6
Germany	German	90.4
Finland	Finnish	86.4
Switzerland	German	83.0
West Indies (other than Cuba and Porto Rico)	English*	73.1
Pacific islands	English*	71.5
Montenegro	Montenegrin	69.4
Canada	English*	65.3
Central America	Spanish	64.1
Roumania	Yiddish	62.7
Russia	Yiddish	52.3
Belgium	Flemish	51.1
Turkey in Asia	Syrian and Arabic	47.0
Hungary	Magyar	46.0
Turkey in Europe	Greek	38.3
Africa	English*	34.7
South America	Spanish	32.2
Austria	Polish	28.0

*Including persons reporting Irish, Scotch, and Welsh.

It is apparent that for most of the important countries the number reporting the same mother tongue is so large that the inquiry adds little to our knowledge of the people. This fact is, of course, in itself a contribution to population statistics. Of the numerically important countries of birth Switzerland, Canada, Russia, Hungary, and Austria, are the only ones where the dominant mother tongue comprises less than nine tenths of the total, the percentage in Austria being the lowest, 28 per cent. It is worth noting that more than nine tenths of the persons born in Germany speak German. Since

the number of persons from Germany is very large the 10 per cent. of non-Germans included in it are worth considering. They are of course for the most part Polish. It is interesting to observe, conversely, that of the 2,759,000 persons of German mother tongue, only 2,260,000 came from Germany; Austria, Russia, Switzerland, and Hungary each contributing a large number of Germans. When both the first and the second generations are included the total number of German stock is 8,817,000, or more than a million greater than the number having Germany as a country of origin, 7,728,000.

4. The mother tongue inquiry, in our judgment, has justified its inclusion in the population schedule. It has furnished a basis for determining the number of persons of several ethnic affiliations that had previously been dependent on guesses. If the ethnic composition of the immigration from a country should change, as it is apparently now changing in the case of Russia, the mother tongue figures will furnish a measure of the effect of the change on the population of the United States. To afford the maximum amount of usefulness the data on mother tongue, whether tabulated in detail for all countries of origin or not should, for some of the important and ethnically heterogeneous countries, appear as subheads under the names of the countries; all the figures presented for such countries would then be subdivided by mother tongue, as is now done in the case of Canada. In that way the information about age composition, occupations, literacy, naturalization, etc., would be available not only for countries of origin but for the principal mother tongue groups, and that without a laborious double tabulation. The experience of the Thirteenth Census seems to indicate on the whole that the mother tongue question is well worth retaining in future enumerations, at least as regards such ethnically composite countries as Russia, Austria, Hungary, and Germany.

The final table shows for 1910 the principal mother tongues, reported for foreign-born white persons and for the total foreign white stock which includes the foreign born and the natives of foreign or mixed parentage.

TABLE III.

Mother Tongue.	Foreign-born White.		Foreign White Stock.	
	Number.	Percentage Distribution.	Number.	Percentage Distribution.
Total	13,345,545	100.0	32,243,382	100.0
English*	3,363,792	25.2	10,037,420	31.1
Germanic				
German	2,759,032	20.7	8,817,271	27.3
Dutch and Frisian	126,045	0.9	324,930	1.0
Flemish	25,780	0.2	44,806	0.1
Scandinavian				
Swedish	683,218	5.1	1,445,869	4.5
Norwegian	402,587	3.0	1,009,854	3.1
Danish	186,345	1.4	446,473	1.4
Latin and Greek				
Italian	1,365,110	10.2	2,151,422	6.7
French	528,842	4.0	1,357,169	4.2
Spanish	258,131	1.9	448,198	1.4
Portuguese	72,649	0.5	141,268	0.4
Roumanian	42,277	0.3	51,124	0.2
Greek	118,379	0.9	130,379	0.4
Slavic and Lettic				
Polish	943,781	7.1	1,707,640	5.3
Bohemian and Moravian	228,738	1.7	539,392	1.7
Slovak	166,474	1.2	284,444	0.9
Russian	57,926	0.4	95,137	0.3
Ruthenian	25,131	0.2	35,359	0.1
Slovenian	123,631	0.9	183,431	0.6
Serbo-Croatian	105,669	0.8	129,254	0.4
Croatian	74,036	0.6	93,036	0.3
Dalmatian	4,344	†	5,505	†
Servian	23,403	0.2	26,752	0.1
Montenegrin	3,886	†	3,961	†
Bulgarian	18,341	0.1	19,380	0.1
Slavic, n.s.	21,012	0.2	35,195	0.1
Lithuanian and Lettish	140,963	1.1	211,235	0.7
Unclassified				
Yiddish and Hebrew	1,051,767	7.9	1,676,752	5.2
Magyar	229,094	1.7	320,893	1.0
Finnish	120,066	0.9	200,688	0.6
Armenian	23,938	0.2	30,021	0.1
Syrian and Arabic	32,868	0.2	46,727	0.1
Turkish	4,709	†	5,441	†
Albanian	2,312	†	2,366	†
All other	646	†	750	†
Unknown	116,272	0.9	313,044	1.0

* Includes persons reporting Irish, Scotch, and Welsh.

† Less than one-tenth of 1 per cent.

REVIEWS AND NOTES.

"The Supposed Death-Rates of Abstainers and Non-Abstainers and Their Lack of Scientific Value." By Edward Bunnell Phelps. New York: Thrift Publishing Company, 1913. pp. 30.

Following up his study of about a year ago on "The Mortality of Alcohol," Mr. Phelps, in the present monograph, reviews the evidence offered by the insurance companies of England upon the difference in the death rates of abstainers and non-abstainers among their policy holders. Mr. Phelps reaches the conclusion that this evidence is insufficient to furnish an accurate numerical measure of the difference in death-rates and offers the following objections.

First, practically all of the statistics of life insurance experience as to abstaining and non-abstaining policy holders rests upon a statement made by these policy holders at the time of applying for their insurance. It is assumed, therefore, that the habits of the policy holders have not changed since the time their policies were taken out.

Second, there is a strong temptation for a man who is being examined as to his physical condition when an applicant for a policy, to understate the amount of drinking of intoxicants. He feels that he is being weighed and tested and is anxious to make as good a showing as possible.

Third, it is difficult to draw any clear distinctions between those who rarely use intoxicants, those who are temperate and those who are moderate in the use of liquor. Those who rarely use intoxicants are the type who, perhaps two of three times a year at a banquet, drink one or two glasses of champagne. It is improbable that if this were the only use of intoxicants it would affect the death rate.

A much more probable explanation of the difference between the death-rate of abstainers and non-abstainers is that they form two more or less distinct types. The man who is a total abstainer in the matter of intoxicants is quite likely to leave tobacco alone and to be moderate in his eating and regular in his habits. The drinkers are more likely to be users of tobacco, to keep late hours, and to be immoderate in their eating. To attribute all of this difference in death-rate to the use or non-use of alcohol seems unscientific. This little monograph makes interesting reading and is, at the same time, a plea for a more scientific study of this question.

W. B. Bailey.

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The Statistical Experience Data of the Johns Hopkins Hospital, Baltimore, Md., 1892–1911. By Frederick L. Hoffman, LL. D., F. S. S. The Johns Hopkins Hospital Reports—Monographs. New Series, No. IV. Baltimore: The Johns Hopkins Press, 1913. pp. 161.

In this monograph the author has made a distinct contribution to hospital and medical statistics. In the opening pages a plea is made for uniformity in hospital blanks and for the necessity of distinguishing sex and age in any tabulation or analytical work on mortality or morbidity. During the twenty-year period ending with January 31, 1912, the total number of male cases treated in the Johns Hopkins Hospital was 41,026 and of female cases 41,399. The material during the decade 1902–1911 was analyzed in more detail than during the earlier decade. During the later decade the average admission rate to the hospital was 81.8 per 10,000 population of the city of Baltimore. For white males the admission rate was 79.9 and for white females 70.4. For colored males the admission rate was 99.9 and for colored females 135.4.

The experience of the hospital during the decade ending with January 31, 1912, includes 22,819 male and 24,138 female patients. The average mortality rate was 7.6 per cent. for males and 4.1 per cent. for females. The white male death rate during this decade was 6.6 per cent. and for colored males it was 12.6 per cent. For white female patients the death rate was 3.6 per cent. and for colored 5.3 per cent. The mortality was high under 15 years of age, reached the minimum for the group 15 to 24 years and then increasing with advancing years. The rate for those 65 years and over was uniformly higher than for any earlier decennial age group. It is therefore evident that it is unfair to compare the mortality rates of different hospitals without taking into consideration the age at which the patients are admitted and, at the same time, whether surgical or medical cases are in the majority. In the monograph death rates are computed according to the principal causes of admission.

Following the analytical section of the report is included a bibliography covering 5 pages. After this the detailed tables covering over 100 pages complete the volume. No student of the subject of morbidity or mortality can afford to leave this monograph unread. It is to be hoped that other hospitals will tabulate and publish their experiences along the lines laid down by Dr. Hoffman.

W. B. B.

Publications of the American Statistical Association.

The New Series of the Association, issued quarterly, will be sent to members of the Association on payment of the annual dues of two dollars. The subscription price is also two dollars per annum. Separate copies can also be purchased upon remittance of the advertised prices.

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